SELECTIONS

FROM

THE RECORDS

OF

THE MADRAS GOVERNMENT.

OOTTERPARAH PUBLIC LIBRARY

Published by Authority.

No. X.

REPORTS

ON

IMPORTANT PUBLIC WORKS,

FOR

1852.

Madras:
PRINTED BY H. SMITH, AT THE FORT ST. GEORGE GAZETTE PRESS.
1854.

240.95482
SEL/S

REPORT OF THE PRINCIPAL WORKS EXECUTED IN THE SUB-DIVISION DURING THE YEAR 1852.

The following are the principal New Works, which were executed in the Sub-Division, during the year 1852.

1. A head sluice to the Croostarsuze channel, which is supplied by the annicut thrown across the Shadda Nuddee river, near the town of Ankapilly in the Vizagapatam District.

2. Under sluices in the body of the work.

3. Head sluice to the Poolyportoo channel which is led off from the site of the annicut across the Pundeiroo river.

4 Under sluices in the body of the annicut.

5. An annicut across the Marlala Gedda Nullah called the Cundee Ghuttoo, and

Head sluice across the irrigating channel led off from the above.

6. The rebuilding of the piers of the bridge across the Bimlipatam river, which had been destroyed, and the construction of an additional bridge of 3 arches in the embankment, forming the approach.

7. The repairs to twelve miles of the Trunk Road. between the towns of Yellamunchilly and Cassimcottah, and of

8. 12 miles more, between Ankapilly and Soobarum.

In the Ganjam District, there were no new works of irrigation, from my not having had time to frame any estimates during the preceding year, the only work of consequence, was the cutting of a fresh head to an irrigating channel in the Hoondah of Pattalagam. Besides this, there were commenced

1. A new hospital for the jail.

2. A beacon for the use of the shipping at the Port of Calingapatam, and

3. Considerable repairs to the Zillah Court House.

A

Head and under sluices to Shadda Nuddee annicut.

Do. Do. to Poolapurtee annicut.

The first 2 sets of works Nos. 1 and 2, and 3 and 4, are those mentioned in my report for 1860, as required to complete the arrangements for regulating the flow of water, in the channels led off from the sites of the annicuts, built across the rivers from which they are taken.

The head sluice across the Croostarauze channel, has 5 vents, each of which are 7 feet high and 4 feet broad. The shutters consist simply of separate planks of teakwood 14 feet long, 1 foot broad, and 3 inches in thickness—these are severally raised and depressed as needed, according to the quantity of water required in the channel, by means of a lever acting on a piece of iron passed through holes, drilled at convenient distances in the planks. The floor of the sluice is placed at 1 foot, above the level of the bed of the river, or three feet below the crown of the annicut.

The under sluices in the body of the annicut are built nearly contiguous to the head sluice, but an angle to it.

The floor of these sluices is 1 foot below the floor of the head sluice, and they are intended to act as a scour upon the part of the river, immediately in front of the latter work, and so prevent that accumulation in the head of the channel, which otherwise takes place in almost all Indian rivers.

The estimate for these works amounted to Rupees 2,015-9-10 and they were completed before the commencement of the monsoon at a cost of Rupees 1,857-13-9.

The second set of works, were constructed for the same purpose at the Poolapurty channel, and are exactly similar in design, but not so large. The head sluice consisting of 3 vents each 3-6 feet high by 4 feet wide and the under sluices of 3 vents each 2-6 feet high and 3-6 feet wide. The estimate for these set of works amounted to Rupees 1,488-15-5 and their cost to Rupees 1,357-14-4.

The intention of these 2 sets of works, was to regulate the entrance of water into the respective main irrigating channels, and to prevent the destruction of the banks of the channels themselves, and of the different reservoirs fed by them; so that they were rather for the purpose of preventing losses, than of increasing the revenue. It so happened however that at the close of last year, from extraordinary high freshes, the river rose several feet above the maximum height, remembered for several years, and though no injury was sustained to the sluices, yet the embankments of the channels below, by being over-topped on the river side, were swept away for many yards, and the annicut across the Shadda Nuddee breached, through the river having risen above the western wing wall, and cutting away the solid ground against which it abutted; so destroyed the wing wall itself, and many yards of the annicut likewise. Up to the end of the monsoon, until this extreme fresh occurred, the sluices had been acting most beneficially. In the present year, these damages have been repaired, and the side walls of the annicut raised 3 feet above the extreme freshes of 1852. No. 5 is an important little work intended to dam up and convey all the drainage water, from lands already irrigated above it, to fresh lands, hitherto only dependent on the local rains.

Marlala Gedda annicut or Cundee Ghuttoo.

The annicut was built 90 feet in length, with a perpendicular fall of 7 feet on to a masonry apron overlaid with cut stone—the wing walls being 15 feet high. The head sluice consists of 2 vents, each 8 feet high by 4 feet wide.

Unfortunately the extreme fresh in the Shadda Nuddee river, combined with the great quantity of rain which fell within a short space, swelled the drainage nullah to an unprecedented extent, the whole plain on either side was one sheet of water, some feet deep; the only communication between the villages was by boats, and consequently the wing walls of this annicut were over-topped, and the eastern one cut away, carrying away with it about 2 yards in length of the annicut. In order to guard against a similar accident, the annicut has been lengthened this year, from 90 to 120 feet, and the wing walls raised 3 feet higher. The drainage nullah has been embanked, and a subsidiary drainage channel cut into the irrigating channel led off from the annicut, which while it relieves the original channel, conveys at the same time the water to the large tanks fed by the annicut, and escapes over the Calingulahs constructed in their banks. This being the first year, the works have been in operation, their beneficial effect will not be recorded until next.

The estimate for these works was Rupees 2,727-11-9.

The cost Rupees 2,211-13-4.

Bridge of 11 arches Bimlipatam River.

No. 6. This work was alluded to in my report for 1851, as having been carried out. It consisted in rebuilding the 7 piers which had been undermined and thrown down in 1851, adding 2 more arches, constructing a flooring with rubble masonry throughout the bridge, extending also 5 yards above and below it, and supported on retaining walls, which were further protected on the lower side by an apron of rough stone 4 yards in width. The piers were raised 2½ feet above their former height. In the breach made in the embankment, a supplementary bridge of 3 arches of 10 yards span each, was constructed as far as the piers and abutments, and the river embanked on the south side, between the wing walls of the big bridge and a hill,

Small bridge of 3 arches to Do.

round which the river wound. This prevented the water from rising over the ground in the immediate vicinity of the big bridge, and so creating a parallel current along the foot of the embankment, forming the approach, while the water which rose above the natural bank of the river, and flowed round the other side of the hill above mentioned, was carried off through the supplementary bridge. I am happy to say that although there was a fresh in the river very nearly as high as in the previous year, (the water submerging the tops of the piers) yet no injury was sustained to any part of the work. The arches have been turned, and the bridge completed this year.

The estimate for this work was................................	Rupees,	9,042–7–6
The cost inclusive of the expenditure in 1851 amounted to about..	Rupees,	4,000–0–0
The estimate for the supplementary bridge..................	„	3,688–3–9
The expenditure in 1852, to about..........................	„	1,300–0–0

Repairs to trunk road between Yellamanchilly and Cassimcottah, and between Ankapilly and Soobarum.

Nos. 7 and 8 were works much needed. Though part of the trunk road, they were in a terrible state of disrepair, and proved a great hindrance to traffic, after the setting in of the rains. One bridge of 2 arches of 12 feet span each, and 7 feet high to the crown, was constructed over the worst nullah, and several small tunnels across the numerous irrigating channels, which intersected the road at all points.

The estimates were respectively Rupees, 3,413–7–7, and Rupees 1,408–1–3, and Rupees 703–4–2.

The above portions of road though they formed only part of the trunk road, the whole of which was in a very bad state, were repaired first, as they lay through the principal portion of the sugar growing district, and led directly to the port of Bimlipatam. The remaining part of the road from Toonie to Yellamunchilly, has subsequently been estimated for, and the work put in execution this year.

There still remains the part from Soobarum to the bridge at Chittivulsah to be sanctioned. All the worst rivers and Nullahs have been provided for between Toonie and Soobarum, but there still remain 1 river and a few nullahs, which it will be necessary to construct before the road can be styled perfect. These were not entered in the original estimate as my wish was to get rid in the first instance, of all those that formed absolutely impassable obstacles to the passage of traffic.

The few works in the Ganjam district, do not call for any particular notice.

Excavating a new head to the Paltalagum channel.

The excavating a new head for about a mile in length to the Paltalagum channel, was performed under ordinary estimate at an expense of 1,000 Rupees, and proved very serviceable in filling tanks which had hitherto received no water from the hill stream, from which this channel is taken off. The annicut across the stream, the extension of the channel itself, and the subsidiary sluices were estimated for in 1852, but not sanctioned until the present year. These works have been partially carried out. The revenue hitherto about 4,800 Rupees has fluctuated about 1,000 Rupees, but last year was fully collected, and an increased revenue is hoped to be obtained from the extension of the works.

Jail Hospital.

Estimate Rupees 2,561–8–10.

Jail Hospital.

This building was commenced this year, but not in sufficient time to be roofed. It consists of one long ward for male prisoners, a separate one for females, a surgery and two extra small rooms for particular cases. The former hospital was very confined and ill ventilated. The building was completed this year

Calingapatam Beacon.

Beacon at the Port of Calingapatam.

Estimate Rupees 854–13–0.

This is an obelisk whose total height is 64–4 feet being a pointed shaft 48–4 high, standing on a pediment of 9–4 square and 16 feet high.

It stands on a jutting promontory of land, and is exceedingly useful to ships making the port, which otherwise is difficult to find, as it lies low and has no distinguishing land mark. As the shaft increased in height, the work unavoidably progressed but slowly, and before it could be finished, the monsoon had set in. It has however been completed this year.

Repairs to Zillah Court House.

Rebuilding a portion of the Zillah Court House.

Estimate Rupees 1,289–7–2.
Cost, „ 1,433–3–6.

This is a building held by Government on a tenure, that they execute all the repairs that may be required from time to time. The walls of this building having cracked very much, and the roof greatly decayed, it was necessary to pull down and rebuild a great portion of the original structure. The work was executed under the superintendence of the Principal Assistant Collector and his department.

Appended to this report are statements of the expenditure on public works classified for 10 preceding years—the cost of the Civil Engineer's establishment, I am only able to supply for the 5 years during which the district has been created into a separate division.

The only important works executed in these districts having been executed only within the last 3 years, and been so recently noticed in detail, in the two last reports submitted, it does not appear necessary to repeat, what has been said regarding them, but simply to add that their state and the returns from them are both improving.

The different members comprising the Civil Engineer's department in 1852, consisted of one Officer, 2 Non-Commissioned Officers, and also for about 6 months of the year 2 Surveyors, but during the other half of the year, there was only one Surveyor.

My own time was employed principally in the Vizagapatam District, and Vizianagram Zemindary, in which latter, I had a large work which required my constant personal superintendence.

One Non-Commissioned Officer was employed in superintending the construction of the Bimlipatam Bridge, and partly in the Zemindary, until orders were received from the Board to discontinue his services in this last.

The other in looking after the works in the Sub-Collectorate of Ganjam, and in inspecting the Irrigation works in the Northern Talooks. One Surveyor was employed in making a survey of the proposed Road into the Maliah country, in which he contracted a Fever, which cost him his life. The other Surveyor in estimating for ordinary repairs in both districts, and superintending the execution of the works in Vizagapatam, mentioned in this report, and inspecting the ordinary repairs executed by the Talook servants.

The cost of the works superintended by Assistant Surveyor Georges amounted in aggregate to Rs. 6,943-8-11.

The number of works inspected by him during the year amounted to 220.

The cost of works superintended by Mr. Overseer Walker amounted to Rs. 3,416-5-10 and,

The number of works inspected by him to about 100.

The amount of the works superintented by Mr. Supervisor Robertson in the Government Talooks, to... 9,000 Rs.
and in the Zemindary to.. 20,000 Rs.

The particulars mentioned in Paras 6 and 7 of the Board's orders, dated 17th March last, having been already enlarged upon in my Report for the year 1851, forwarded in 10th May last, I do not recapitulate them here, but I think the present is a fitting opportunity to state how exceedingly beneficial the expenditure in Vizagapatam, has proved this year; in which there has been such a scarcity of rain. That part of the Survasiddy Talook, which is irrigated by means of the works estimated for by Captain Collyer, and since annually improved, was the only part of the district, in which there was any cultivation to be seen, and I am sure, I am stating within the mark, that, had it not been for these works, ⅔d of the revenue of the talook must have been sacrificed, as it would have been impossible to have collected any money from the people, as their fields would never even have been ploughed, and much less covered with cultivation. The works in their original state, could not have afforded the supply that they have been doing, since improved; the freshes in the river have been but scanty, but then, every drop of water has been saved, whereas the dams were before in such an imperfect state, and the channels so choked up and out of order, that the water would have run off to waste into the sea, before it could have been stored.

The Golconda talook now requires to be put into order, as the irrigation works there, are in a sad ruinous state. I hope to make a beginning in this talook in the coming season, as also to pay attention to the wants of the Ganjam district.

The communications still require a great deal of attention. The ports up to this time have been perfectly isolated from the rest of the district, except during the dry months of the year, but I trust the estimates, which have been sanctioned for both districts, and the works executed this year will make the Ports more accessible, and give a greater stimulus to trade. The districts of Vizagapatam and Ganjam abound with such a variety of useful products, fit for exportation, that they are much sought after by European capitalists, and as will be seen by the returns of Trade appended, the exports have rapidly increased during the last 5 years.

The Port of Calingapatam especially, is again rapidly rising into importance, and the new roads from the interior, for which estimates will be very shortly submitted, will I hope be the means of creating a still greater stimulus to trade.

The Ganjam district and especially the southern portion of it, has been repeatedly noticed by the Commissioner for the Northern Circars, as evidencing an unprosperous state, and it certainly outwardly bears the marks of impoverishment. A good deal of this is doubtless owing to the bad state of the irrigation works, and also to the total absence of roads to convey to the Ports, what produce is grown, except at an higher rate of carriage, than the reduced prices of grain can bear, while that facility of intercourse between large and distant markets in the interior, so necessary for the establishment of brisk commercial enterprise, has hitherto been utterly impossible, or accomplished only with innumerable difficulties; the consequence of stagnation in trade, and in the circulation of money has resulted, and while bullion has been removed from the district in the shape of the revenue collected, and in the purchase of the necessary articles of life, brought from a distance, but very little in comparison, has found its way back again. As this state has now continued for some years, it must have operated in a constantly increasing ratio, to the gradual impoverishment of the people, and their consequent inability to regain a state of prosperity. The principal wants of the district as far as I am able to judge, are as follows :—

First. A want of capital.

Secondly. A security of raising the produce of the land by irrigation independent of the seasons, and of obtaining the heaviest crops at the smallest expense.

Thirdly. The establishment of good communication from the interior to the Ports, and between the principal market towns.

The first will doubtless be supplied in process of time, by the two last being carried out, and if the above view of the case be correct, it is manifestly to the interests of the Government, to spend large sums in carrying out the works necessary to supply the two last mentioned wants, as they will thereby directly enrich the people by affording an extra source of income, and in proportion as the facility for raising the crops is increased, and the cost of carriage diminished, the greater will be the number of hands set at liberty to be engaged in other pursuits, by which capital will be accumulated, and the gradual but certain renovation of the country be obtained.

F. H. RUNDALL, Lieut,
1st Asst. Civil Engineer Sub-Division.

Civil Engineer's Office, Sub-Division,
Camp at Waltair,
On the 21*st October* 1853.

No. 75.

Civil Engineer's Office, Kistnah Division
Bezoarah, 24*th February* 1854.

From Captain C. A. ORR,
Civil Engineer in charge Kistnah Division,

To Captain J. H. BELL,
Secretary to the Board of Revenue, D. P. Works, Fort St. George.

Sir,

It appears that in the districts forming the present Kistnah Division, no works of sufficient importance to require special notice, were undertaken in the year 1851–52 either for the extension of irrigation or the improvement of the means of communication, for it being expected that the construction of the Kistnah Anicut would soon be commenced, introducing a new system of irrigation and communication by river canals, attention was solely given to the ordinary works necessary to secure merely the usual revenue from existing tanks and water courses.

2. The enlargement of the Boodam Calingulah, on an estimate of Rupees 1,133-7-0 was carried out, at an outlay of Rupees 1,104-9-0. This Calingulah was built across the old Toongaboodra for the purpose of throwing water into the Boodam and Karlipollium tanks, and a better supply into the large tank of Alloor. Since its erection the country in its neighbourhood has been inundated more than usual during the high freshes of the Kistnah, and the Calingulah being supposed to be the cause, its enlargement was thought necessary. But as the heavy floods, which of late years have done so much mischief to the lower parts of the delta, are the natural effect of enlarging the heads of the channels, without at the same time providing the means of regulating the admission of water from the river, little benefit will be derived from increasing the width of the Calingulah in this case, till the new arrangements connected with the Kistnah Anicut project be introduced.

3. Talook Cutcherries of an improved, commodious, and substantial description were erected at Guntoor and Nursarowpett at a cost of Rupees 2,598-11-1 and Rupees 1,659-6-9 respectively.

4. Since assuming charge of this Division in 1852 my time and attention have been so fully occupied by the Anicut and its subsidiary arrangements, that I have not acquired sufficient knowledge of preceding operations, nor can I now obtain information to enable me to report in the detail prescribed by the Board in its proceedings of the 17th March 1853 No. 214.

I have, &c.

CHARLES A. ORR, CAPTAIN,
Civil Engineer in charge Kistnah Division.

Bezoarah, 24*th February* 1854.

Civil Engineer's Office, Godavery
Division, 15*th April* 1854.

REPORT ON THE IMPORTANT WORKS EXECUTED IN THE GODAVERY DIVISION DURING THE YEAR 1852.

1st. During the year 1852 the Godavery works made very rapid progress; the sum spent upon them from the sanctioned amount of 25 lacs, being 343,754 Rs. In addition to which, 57,887 Rupees were spent in the Delta, on the restoration of the river embankments and such other works as come under the head of ordinary repairs. As well as 20,772 Rupees spent on the repairs of damages to the new and old works occasioned by the floods in the Godavery and other accidental causes.

2d. The expenditure under the head of Engineer establishment, which included the pay of the Civil Engineer and his establishment of all grades, amounted to Rupees 48,839–8.

3d. The principal works in progress during the year are enumerated in the following list—Wherein is also shewn the sum spent that year upon each of them.

List of Important Works executed during the year 1852.

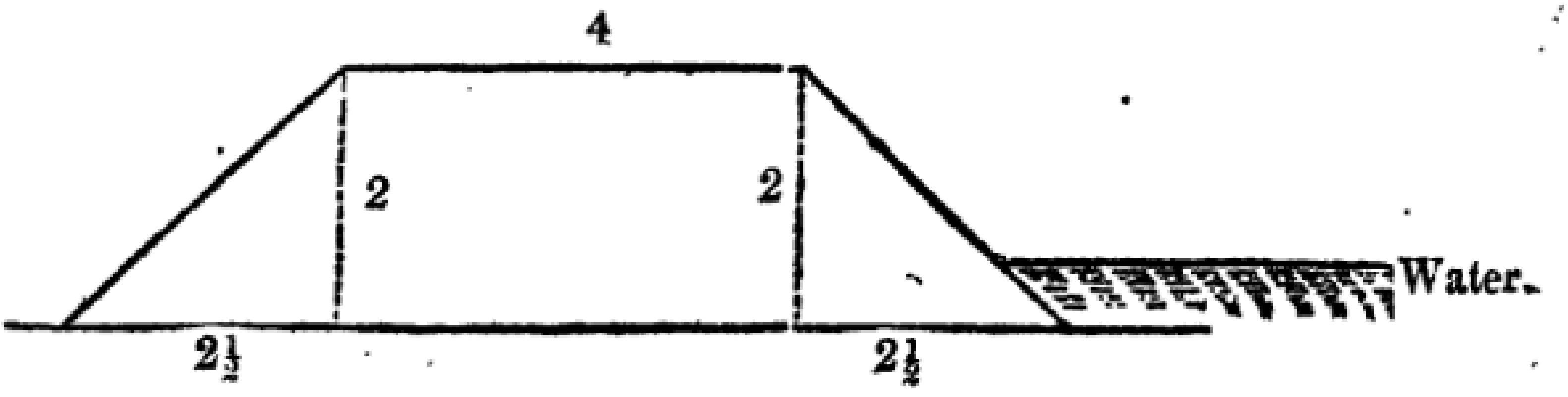
Names of Works.	Amount expended during the year 1852.		Total amount expended up to the end of the year 1852.		Balance of estimates.		Probable remaining cost.	
Occasional Works.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	
Godavery Anicut......................	20,416		909,831	6				
River Embankment from Dowlaiswaram to Yanam......................	6,282	14	34,752	15	241			
3 High level channel on the Eastern side of Godavery	3,046	11	52,027	14	1.079			
Raully channel.	23,985	5	32,480	9				
5 Muddoorlunka Annicut cyclopean work	12,330	0	12,330	0		15		
6 Annicut Calingulah Posts and shutters	14,139	14	14,139	14	8,222			
Nundamoor Lock..	3,417	13	9,117	12			634	2
Mookkamala Lock..	5,609		5,609				5,267	8
9 Parimullah Lock....	19,042		19,042				3,603	1
10 Apparow channel, Weyairoo &c..	383		4,675	13	2,699			
11 Settepett Calingulah	2,303		7.169	14	8		554	6
12 Kakarapurroo channel......................	15,921		16.198	1				
13 Mookkamala Calingulah	2.401		2,041	3				
14 Yellamunchulu channel and sluices...	9,948	14	9,948	14	1,384			
15 Clearing out Gosta Nuddy.............	1,290	12	1,290	12	167			
Do. Venkiah Calvah.	4,634	4	6,142	10	2,190			
Paramilla Calingulah .	1,740	15	1.760	15	1,416		6,676	
Gunnaram Aqueduct..	141,401	8	141,401	8				
Branch channel from Raully to Gunnaram	16,360	6	16,360				4,191	
20 Branch channels below Aqueduct......	14,081	11	14,081		3,101		10,672	
21 Valagathodoo Lock.	7,385	6	7,385				3,224	14
22 Calingulah across the old Thooliah Bagah near Valagathodoo............	1,100	0	1,100					
23 Excavation below Valagathodoo Lock	4,367	6	4,367		4,632		8,594	
24 Widening the head of Thooliah Bagah from Vamagery to the head of Anapurtee Calingulah............	1,033	15	1,033	15	6.116			
25 Ramachindrapooram channel	3,156	14	3,582		28,687			
26 Ramachindrapooram Calingulah........	1,654	12	1,654	12				
27 Drainage channel....	782	5	782					
28 Five miles of channel in addition to the length allowed for the Alamoor channel in the Eastern channel estimate.	4,550	0	4,550					
Total Rupees...	318,783	10	13,34,860					

No.	Names of Works.	Amount expended during the year 1852. Rs.	A.	Total amount expended up to the end of the year 1852.	Balance of estimates.	
	Ordinary works.					
1	Repairs of the Godavery anicut.........	29,296	1			
2	Clearing out the head of Raully channel......................................	1,365	12			
3	Do. below the Head-sluice and along the Gorinka channel.	12,019	4			
4	Clearing out Thoolia Bagah.............	12,688	6			
5	Do. the Head of Do.	1,276	1			
6	Banks across the old branches of the Thoolia Bagah and across the Jummeeravoo...	3,077	5			
7	Clearing out the Nuckala calva drainage channel................................	4,094	9			
	Emergent works.					
1	Protecting Yanam embankment with rough stone..................................	2,600	0			
2	Repairs of the Vizaswaram lock.........	1,487	7			
3	Raising and strengthening the embankment in the limits of Coroomillee and Cota..............................	1,431	7			
4	Closing breaches in the embankment at Chintapillee............................	2,063	13			
5	Dam across the mouth of Oodoo Calva.	1,542	5			
6	Repairs of the embankment in Raully talook..	5,258	9			
7	Constructing rough stone Calingulah near Arattacutta.........................	2,388	14			
8	Repairing breaches in the Godavery embankment and Weyairoo embankments	1,836	13			
	Total Rupees...	82,426	10			

4th. The embankment of the river on the Eastern shore was further improved and put into very good order as far as the village of Kota about 30 miles South of Rajahmundry at which point the embankment on the left bank of the Godavery begins.

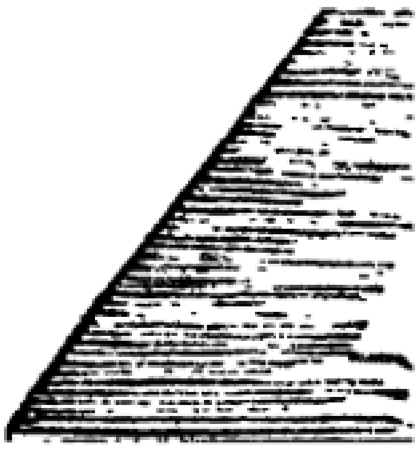
5th. This artificial mound varies in height with the level of the natural bank of the river, the breadth is 12 feet on the top, with slopes on either side about 1¼ to 1. And where correctly made, it is one yard above the highest flood on record.

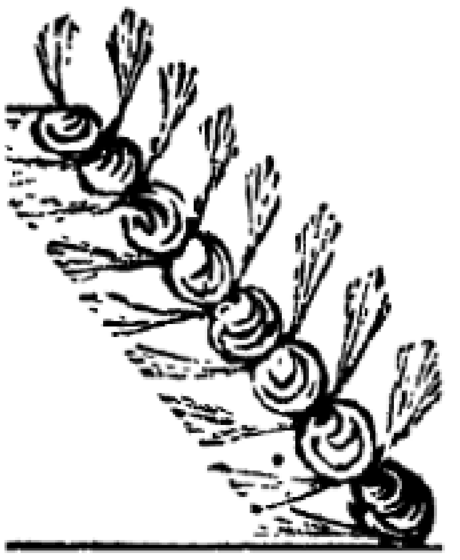
6th. Such floods rarely stand more than 2 feet over the natural bank of the river, the ordinary section of the embankment therefore is as shown below



having an area of 13 square yards and the cost of it is about ½ Rupee a running yard. When these banks become covered with the short creeping grass which is the very best covering that can be given to them,—the effect of the rain is rather to improve than to injure them; and as the current does not wear them while the turf is sound and the floods do not last long enough to kill the grass, there is in such favorable positions very little expense in keeping the banks in repair after they are once in good order. Indeed except where the crest is worn through by cattle being driven across them, they are very rarely injured in any way, and may be said to be quite a secure defence against the heaviest floods.

7th. Where the old and imperfect mounds have been breached, the new embankment has a much larger section, but when covered with turf, and with the additional security of a bed of the high Dhurba grass in front, to break the ripple, it may be considered perfectly safe also. When a new bank has to be raised in such positions, it is usual to face it with what is called here a Tanjore revetment, consisting of rollers of fresh-cut Dhurba grass held to the slope of the embankments by layers of the same grass, one half of which is laid within the soil, and the other half after being bent round the rollers, is turned again upon the bank, and loaded with the soil as the bank rises.





This revetment forms a very fair security against the ripple and current when first built, and as the grass of which it is formed, strikes root, it becomes a permanent and complete guard to the earth work. The rollers are made of any length from 5 to 20 yards and they are, when tied, about 8 inches in diameter.

8th. The only danger that these embankments are exposed to, when ordinary care is taken of them, is from the river making a set against the natural bank and undermining it. Against such an attack, the artificial embankment is no security; and in the year I am speaking of, the river advanced 300 yards during the July flood, undermined the embankment in front of Veeravellapollium, and swept away the village in a few hours.

9th. We shall hereafter have to spend considerable sums annually in order to guard against such accidents in all parts of the river's course; not only to save the country from inundations, but to prevent breaches in the irrigating channels, which follow the course of the embankments.

10th. The plan adopted for defending the points attacked is to throw down lines of loose stone upon the bed, to induce an accumulation of sand where the river is deepening; as the bed rises, the danger decreases, and when the sand, by repeated additions to the low groynes, has been raised to the summer level of the water, beds of Dhurba grass are planted, and the security of the work is effected. We have still much to learn as to the best applications of our means to this end, and we have none of that native skill which has been so well applied in fixing the course of the Cauvery and Coleroon through Trichinopoly and Tanjore.

11th. The Cowlaiswarum channel, or that which runs from Dowlaiswarum close upon the left bank of the river, was this year slightly extended at the cost of 3,046 Rupees. The channel was completed to 20 miles in length, and for 16 miles of its course conveys 100,000 cubic yards of water hourly, for the irrigation of the country south of the Thoolia bagah and for the supply of three important channels which are to be navigable to tide water. One of these (the Coringa channel) will be the chief outlet for the produce of the interior, leading as it does to the principal shipping port in the Bay of Coringa.

The Annicut.

12th. Besides the usual repairs of the rough stone apron of the annicuts, one of them was this year covered by what is termed cyclopean work, i. e. large rubble stones bedded in hydraulic mortar. The word cyclopean would perhaps hardly be given to this elsewhere, as the largest stones used do not exceed in weight ½ a ton, and the smallest do not weigh 50 lbs. The stones are well packed, and the line of which the mortar is made, is, when properly treated, excellent; but, having the peculiar qualities of hydraulic lime in a very high degree, it requires great care in its use. It is applied as soon as it is burnt, and is kept moderately wetted till it sets.

13th. When this cyclopean work was completed over the Muddoor branch, the surface of the anicut was perfect; the whole of the other anicuts having been covered with cut stone.

14th. Colonel Cotton having determined that it was advisable to have the power of raising the surface of the water in the river 2½ feet above the crest of the anicut, made arrangements for doing so during the the summer months, by means of cast iron posts placed in the crest of the work 8 feet apart, with grooves for planks, which could be removed as the river rose. By this mode of raising the water no increased action on the apron, or on the bed of the river beyond it, was caused in the freshes.

15th. The iron posts were cast in the Foundry at Dowlaiswaram, the weight of each was 154 lbs., and the cost of casting was about 87 Rupees a ton. Iron of good quality was obtainable that year at 35 Rupees a ton, and the actual cost of the whole of the posts which weighed 82 tons was about 7,134 Rupees; but as the cost of the Foundry and its apparatus has to be paid for from the work executed, the price charged for the posts was at the rate of 100 Rupees a ton.

16th. On trial it was found that the posts might be 10 feet apart, as with that distance between them, the planks could be placed or removed with the water flowing 2½ feet over the anicut. The distance from post to post was therefore increased to 10 feet on 3 of the anicuts, 8 feet being allowed on the fourth.

17th. It was the intention to have used nothing but teak for the shutters, but a sufficient quantity of that wood not being procurable, timber of various descriptions have been employed, and the planks used are 2 inches thick by 8 inches broad.

18th. The leakage between these planks and below them, is already found to cause a serious loss of water, in the driest months, and it is evident that some plan must be adopted to render them water-tight.

19th. Another very serious objection to the leakage is, that the constant flow of water over the surface of the anicut, makes it so slippery that it cannot be travelled over with safety, when it would otherwise form a most valuable causeway across the river.

WEYAIROO PROJECT.

20th. The system of channels for the irrigation of the lands west of the Godavery, made very considerable progress in 1852. During that year some very important channels were opened; and 2 fine locks and Calingulahs were under construction. The smallest of these works, was a lock of 100 feet long and 15 feet broad, with a lift of 10 feet when there is a depth of 6 feet water over the upper and lower sills.

21st. This lock contains 2,343 cubic yards of masonry and cost 10,876 Rupees. Its object was to give a passage for boats, into the Nuckala (one of the drainage channels of the country,) while the water above it was kept on the level required for irrigation.

22d. For the discharge of the drainage a Calingulah was built with a water-way of 18 feet in breadth, the wingwalls admitting a depth of 6 feet water to pass over the crest of the work. The Calingulah is furnished with cast iron posts 2½ feet high, and grooved for planks; by which the height of the water above the lock can be regulated. The Calingulah has an apron of cut stone, secured by a bed of loose rough stone beyond it. The height from the apron to the crest, is 10 feet. This work cost 2,401 Rupees.

23d. The 2d lock was one with a double lift of 7 to 8 feet, on the main line of channel, which will connect Rajahmundry and the ports of Cocanada, Coringa, and Nursapoor with Masulipatam. This lock was unfinished when the great fresh in the Godavery (September 1852) destroyed the Weyjaswaram lock, and flooded the channels below. The lock sustained no material injury, but the work was delayed, and the cost of baling increased by the accident.

24th. The Peremilla lock is 28 miles from the lime and stone quarries, and the works above it being incomplete, the difficulty in keeping up the supply of materials as well as the cost of its carriage, enhanced very greatly the expense of the building. A description and plan of this lock and Calingulah will be given in the report upon the works executed in 1853, in which year they were completed.

25th. In the centre Delta, the western branch channel was commenced for the irrigation of some portion of the Raullee talook and the whole of Nuggaram ; an area of about 80 square miles, or deducting village sites, roads, channels and waste, about 40,000 cultivable acres.

26th. The Nuggaram talook being separated from the rest of the Delta by a branch of the river nearly ½ a mile broad, it could only receive its share of the water from the anicut, by a channel being carried across the stream by an aqueduct, and a work for the purpose was projected by Colonel Cotton towards the close of the year 1851.

27th. The site chosen for this structure was near the village of Gunnarum, where the breadth of the river was 800 yards. The level of the banks above the bed was 18 feet, over which in high freshes, the flood rises to a height of about 2 feet.

28th. As it was necessary to carry the bed of the channel below the level of the surface of the river during its freshes, an aqueduct of iron or timber which might have been carried flat from pier to pier would have offered much less obstruction to the current of the river ; but masonry is so much cheaper than either of these materials, that Colonel Cotton employed brick arches, making such arrangements to meet the increased velocity of the river, as he considered necessary.

29th. The work was to be built of masonry; it had the loose sandy bed of the river to rest upon ; the breadth to be spanned was 800 yards ; it was to carry over 40,000 cubic yards of water an hour ; and form a navigable aqueduct for the largest class of vessels employed on the Godavery. Its flooring was to resist the velocity due to 18″ head of water, and it was to be completed without the previous preparation of any one material; and made secure against the action of the highest freshes of the Godavery, rising as they do at Gunnarum 18 feet above the bed of the river. The foundations had to be laid 8 feet below high water mark, the rise and fall of tide being 6 feet. And when the order was given to undertake the work, the stone and lime to be employed, were in their quarries more than 30 miles distant from the site of the aqueduct. The whole was to be completed in 6 months.

30th. The aqueduct was so far completed in that time, that it not only bore the trial of an ordinary fresh, but it so happened that in the month of July, before the parapet walls were raised to their full height, the whole building was submerged by one of the highest floods ever known, and for 6 days, no part of it was in sight; on the river falling, it was found to be uninjured.

31st. The sum spent upon this extraordinary undertaking was greatly more than had been calculated upon. And I cannot do better than give the executive officer's report in his own words in explanation of the causes that led to the estimated cost being exceeded.

NUGGARAM AQUEDUCT.

Memorandum by Lieutenant F. T. Haig.

"1st. This work consists of 49 arches of 40 feet span each, resting "on piers of stones and brick, with well foundations, and a flooring of con- "crete under the arches with a small apron of loose stone beyond it.

"2d. It differs from the original plan in one or two particulars.

1*st. In length.*

"3d. The estimate allowed for only 39 arches to span a width of 600 "yards, and provided a very massive flooring and apron of loose stone to "protect the bed under the arches from the effects of the rapid current caused "by the great obstruction which the work would offer to the passage of the "water in high floods; but it was afterwards determined to place the aque- "duct at a point lower down, where the width of the river considerably ex- "ceeds the average, when consequently the obstruction would be less, and "there would be less danger of an accident from the velocity of the current "undermining any of the piers; and it was supposed that this velocity would "be so much less than what it would have been in the former case, that a "much lighter apron than the estimate allowed for would be sufficient, and "that the saving thus gained would meet the additional expense involved "by the increased length of the work.

"4th. The flooring thus substituted for the one originally intended, con- "sists of 5 rows of wells, one immediately in front and another 6½ yards in "rear of the work, with three intermediate ones under the arches; on top "of each row a wall of 1 foot high and 2 feet wide was built at the level "of low water and the spaces between these cross walls filled in, first with "6 inches of broken bricks and tough clay well rammed, and then with "6 inches of brick and chunam concrete.

"5th. The surface of this floor was then levelled and plastered with "a hard and quick setting cement. In front of the up-stream cutwaters of "the piers the front row of wells was extended in a ring with a radius of "4½ yards for greater security.

"6th. Along the front of the upper row a small apron of brick rubbish "was thrown, and along the rear of the lower line a similar one of rough "stone.

"7th. 2d. The arches also as built, differ from the original plan which "proposed to support the water passing over the aqueduct by one main arch "19 feet wide with a rise of 7 feet, and the towing path by another 9 feet "wide, with a rise of 13 feet, both springing from the same line on the piers. "For these two, one arch the whole width of the bridge has been substituted, "with the intention of forming a towing path on each parapet wall, which "is to be widened for the purpose by cornices.

"8th. These are the only alterations introduced in the construction of "the work.

"9th. The estimate was Rupees 73,200-6-4 the expenditure up to the "31st August has been Rupees 131,769-2-4 excess Rupees 58,568-12-0.

"10th. The subjoined is an abstract of the estimate and expenditure "up to the 24th July. The expenditure since then having been placed in "the bill without any details (which there has not been time to furnish) and "being mostly chargeable to the contingent expences.

	Estimate.	Bill.	Excess.
Masonry................	29,748	48,506	18,758
Wells and Apron......	28,720	36,884	8,164
Plastering......	3,732	0	0
Contingent expenses.	11,000	36,313	25,313
	73,200	121,703	52,235

"11th. It is evident from it that the excess is mainly owing 1st, to the "masonry costing half as much more than the estimated rate.—2d, To the "contingent expenses ; the embankments, baling, centerings, and contingencies "amounting to 3 times what they were estimated at.

"12th. So large an excess is difficult to account for—that in the cost "of the masonry especially.

"13th. The estimate allowed 2 Rupees per cubic yard for the plain masonry and 2½ Rupees for the arch work, and from the experience gained on the work I am confident this was ample, and would not with good management have been exceeded, if there had been sufficient European superintendence, and the estimate had been sanctioned in time to allow of our making preparations; such as collecting wood, making bricks, &c. before hand.

"14th. The bricks for the anicut were made for 1½ Rupees per 1,000, and sometimes for less. This is the average price also throughout the Delta, though certainly for bricks much inferior to those we used in the aqueduct; and there was every reason to suppose that with European superintendence, and using wood which was then being cut in the hills for much less than formerly, this would be the outside our bricks would cost.

"15th. The cost of the chunam has hitherto been reckoned at 5 Rupees per garce at the kilns; preparing it for use by mixing with sand, grinding &c. ought not to be more than 4 annas per cubic yard; altogether 8 annas per cubic yard. If we substitute these prices for the actual ones in the cost of the plain, and arch masonry, it will be found that it brings it down below the estimated rate.

"16th. The extremely high price of these two materials bricks and chunam, but especially of the former, is the main cause of the excess in the cost of the masonry.

"17th. The actual cost of the bricks per 1,000 was—

1	For moulding	0	7	4
2	Stacking and burning	0	9	4
3	Carriage of wood to kiln	0	7	8
4	Wood	1	11	5½
5	Sand for mixing with the earth of which bricks were made	0	1	9½
	Sundries	0	5	0
	Rupees...	3	10	11

"18th. Every item in this bill with the exception of the 1st is high, the 2d, 3rd and 4th excessively so, and making every allowance for the hurried way in which the bricks had to be made, and my own inexperience, it seems impossible not to suppose that some of the excess at least is attributable to mismanagement, though to the zeal, energy and untiring industry of the two Europeans who were successively in charge of the brick ground—

" I bear most willing testimony. I have no doubt that if I could have paid " more attention to the brick-making, and more narrowly watched the process " of burning, not only the great improvements in it which were latterly intro- " duced would have suggested themselves at an earlier period, but the expense " of manufacture might in other ways have been very materially lessened. It " must however be remembered that the whole of the bricks 108½ lacks were " burnt in about 3½ months, or at the rate of 1 lack per day nearly, so that I " had not much time for trying experiments, and what I had was but too con- " stantly occupied with the superintending of the other parts of the work. In " fact every particular part of the work suffered from the want of more Euro- " pean superintendence, though I had all, and more than could well be spared " from the other works in progress in the Delta. My time was so completely " occupied with superintending all the petty details of the work, which might " have been equally well looked after by subordinate Europeans, that I could " never bestow that attention upon any one part of it which it required. A " larger and better trained European superintendence would have effected an " immense saving.

" 19th. In a work carried on in this country at the rate at which this " was, one European to every 400 coolies would be only sufficient ; whereas " the most I ever had was 1 to 1000, and that only for a short time and for the " greater part of the time one to 2000, and this with scarcely one single native, " with the exception of the native maramut superintendent of whom I shall " speak afterwards, and one or two others, who was worth any thing.

" 20th. The coolies are grossly idle, the bricklayers worse, and the " peons worse still ; it is not too much to say that there was scarcely a native " employed on the work who if unwatched would not have sat still half the " day, and done nothing—practically what with the idleness of the coolies, and " the ignorant and useless way in which they waste so much of their labour, " and the utter inability of the native peons and maistry to direct them—I do " not believe that the amount of work got out of each man was more than half " which it might have been.

" 21st. The difficulty of burning the bricks thoroughly met us at the " outset. The first kilns were built in the English manner under Overseer " Sage and precisely similar to those in which he had a few months before " burnt without any difficulty all the bricks required for the Chettypett lock " and Calingulah ; but every kiln when opened turned out a complete fai- " lure ; the bricks were only half burnt, and the utmost care and most vigilant " watching of the fires both day and night by Overseer Sage produced no " better result, the native clamps were then tried, such as are generally used " throughout the district ; the men who had burnt all the bricks for the

" anicut and for Messrs. Arbuthnot's Factories tried every sort of clamp but " without success, though a reward of Rs. 50 was offered to any man who would " turn out a well burnt one,—all failed.

" 22d. We then resorted again to the English kilns and after many experiments succeeded by modifying the construction so as to secure a greater " draught and stronger heat, in burning the bricks properly. An immense " quantity of wood was used on these experiments, and a large number of " bricks wasted, the cost of which has of course all been added to that of the " bricks afterwards made.

" 23d. Having once found a way of burning the bricks, we were only " too glad to adhere to it, though we afterwards found towards the conclusion " of the work that it was capable of very great improvement, the form and " dimensions of kiln we had used was the same as that in general use at " home, and which the Overseers and Sappers are instructed how to use at " Head Quarters Sappers and Miners; but we found that it was narrower " than was necessary, and gradually went on widening it till we found at last " that kilns of double the width and holding consequently double the number " of bricks, were thoroughly burnt with just the same quantity of wood as was " used in the kilns of ordinary shape. Had we known this at starting a " saving of one half the quantity of wood used would have been effected.

" 24th. Yet when difficulty in burning the bricks was first found, there " was not a man in the department who could show us how to get over it, so " we had to find out for ourselves, and pay for our experiments. The earth of " which half the bricks were made is undoubtedly very refractory, and requires a stronger heat than ordinary to burn it properly; we afterwards used " another kind found on the opposite bank of the river, which was more manageable, but this required an admixture of half its bulk of sand to prevent its " cracking in the sun, and in the fire, and consequently involved the additional " expense of this material. The bricks turned out of these kilns are far superior " in every way to those made in the native clamps, but careful watching of the " fires both day and night is required. In spite however of the vigilance of the " European overseer the Natives not unfrequently let some of the fires greatly " slacken or go out at night, and then the kilns had to be burnt over again, " much of the wood also which we got down from Dowlaiswaram was of little " use, as was a portion of that cut afterwards in the talooks. A heavy burst " of rain in March destroyed not less than 15 lacs of sun dried bricks, and " losses from the same cause afterwards amounted to at least another 5 lacs. " The rain also spoilt the burning of several of the kilns which had thus to be " burnt twice over.

“25th. All these causes helped to raise the price of the bricks, but the principal ones were, our inexperience in brick burning, and the waste of labour through the want of sufficient European superintendence. The cost of the chunam was as follows :

“ At kiln per garce	7	6	3
“ Carriage from Rajahmundry and Dowlaiswaram	1	14	5
“ Carriage from boats to mills, mixing and grinding in mills and sand	7	10	10
“ Materials, superintendence, sundries, cost of mills, &c	0	15	9
Per garce	17	15	3

“26th. According to the Rajahmundry and Dowlaiswaram accounts the quantity of chunam sent to Gunnarum was 1,145 garce, and if this be correct, the price at the kilns would be only 5 Rupees per garce, but as 782 garce, is the outside that can have been used (3 paras to the C. yard) I have charged for this quantity at the rate of Rupees 7–6–3 per garce, instead of the 1,145 garce at 5 Rupees. This caused an excess of Rupees 2–6–3 in the price of chunam at the kilns above the estimated rate.

“27th. The cost of grinding and carriage to the mills is also very high, but 288 garces for the arch work out of the whole 782, were beaten by hand after having been ground, to secure better admixture which would at once double the cost of this portion, and the sand for all the work had to be brought from a distance of 400 yards, and then sifted.

“28th. The chunam was also nearly all carried by coolies, for expedition sake from the boats to the mills, an average distance of 400 yards, and at the commencement of the work very much farther. I do not however put these forward as sufficient reasons for the high price of this item in the cost of the mortar which I think is mainly attributable to the waste of labour from want of better superintendence.

“29th. The cost of the wells (2 Rupees per C. yard) is double what it generally is, this is principally owing to the high price of the bricks, and also to the broken rubbish used for filling the wells, (and also in the flooring) being charged for at the same rate as the whole bricks, which I believe is not generally done ; it is however necessary to do so in this case, for the one certainly cost as much as the other, and the quantity used was, from the large number of wells under the flooring and piers, more than half as much as the quantity of whole bricks used in the masonry.

" 30th. The same causes which affect the price of the brick work in " other parts of the work, apply equally to the flooring and apron. The " quantity of sand removed also was very heavy.

" 31st. The centerings cost more than double what the estimate allowed. " I do not think they could have been put up and removed with the same " speed for less money, 30 out of the 49 arches were turned at the rate of " from 1¼ to 1½ arch per day, we had consequently to put up the centerings " at this rate ; 22 were in use, being struck and moved to the front for the " next arches. They were made of palmira trees which had to be cut and " carried to the spot by boats and bandies, and had to be moved about at the " work, entirely by hand.

" 32d. The baling and embankments were estimated at Rupees 3,000, they " cost 13,802, the embankments alone cost Rupees 5,304 and the baling Rupees 8,497.

" 33d. It was hoped that the whole of the baling would have been done " by steam for a trifle. The engine however which drove the baling wheel, " was not ready in time for the 1st part of the work, and the foundations for " the piers were baled entirely by coolies.

" 34th. It was however up and ready for work in time to have drained " the bed of the river to the depth required for laying the flooring and apron ; " but owing to insufficiency of steam, and one or two other minor difficulties, it " turned out to be of little or no use, after having been put up at an expense " of Rupees 4,358, and the whole of its work had to be done by coolies working both night and day, and at a great expense.

" 35th. Heavy rain setting in too before the flooring was completed, " greatly increased the cost of baling, driving the night coolies away from their " work ; while the basin filled meantime both from the rain and springs in the " sand, and all their work had to be done over again.

" 36th. It was necessary to keep from 500 to 700 coolies at work, baling " all day and the same number at night, and the pay of the latter had of course " to be increased to 2 Annas per man.

" 37th. The embankments cost more than with better management " they need have done. In attempting to shut out the tide water at the com- " mencement of the work we spent 1,500 Rupees on a bank which we were " eventually obliged to give up, and to make one in place of it, at a more " favorable point in the bed of the river. Five distinct banks were required, " whose aggregate length was not less than 2,800 yards, to shut off the river " and tide water ; one across the river immediately in front of the aqueduct, "and another in rear, with a sluice to keep the water in the enclosed basin "down to the level of low water, and 3 others higher up the river, across the "heads of the Vynathaem branch, by which the freshes were kept out until "the 24th June. All had to be made very strong and faced with tatties to "protect them from the waves during squalls, and the two at the work requir-"ed a party permanently stationed on them to watch and repair them.

"38th. Under the head of contingencies, are placed 1st, the experimental "arch—2d, a temporary lock on the Gorinkala channel near Eatacota—3d, "sheds for the coolies, bricklayers, and Goomastahs, altogether not less than "2,500 people employed on the work—4th, materials of all sorts required for "work generally, but not easily assignable to each particular part—5th, the "Dowlaiswaram work-shop bill for work of all kinds done there, being the "balance of the actual bill after striking out and including in the cost of each "particular portion of the work, as above noticed, those items which are fair-"ly chargeable to it, and 6th, sundries amounting to Rupees 4,171 the details "of which are given in another place.

"39th. The experimental arch was built to see whether it would be "possible to turn our other arches without centerings. The immense assist-"ance which such a method of building would be in all larger bridges in this "country when the great danger is of the river coming down before the cen-"terings are removed and carrying them away and so bringing the arches "down, fully justified the experiment; and the result proved that the thing "is perfectly practicable; an arch of 40 feet span and 10 feet in width, was "thus built, and parapet walls of the full thickness of those of the aqueduct "which are to support a pressure of 5 feet of water, were built on it. The "arch had however some defects which might no doubt be remedied by the "use of better shaped bricks, and this together with the want of more ex-"perience regarding the stability of arches built in this way, seemed to ren-"der it unadvisable to apply the method on a larger scale, and where it would "be exposed to so severe a test, as in the aqueduct.

"40th. The lock at Eatacota was rendered necessary as a temporary "measure by the state of the Gorinkala channel, by which the supplies of "stone and chunam were brought from Dowlaiswaram, and a large portion of "wood from the Raullee talook. The channel had on this part too great a "fall; there was consequently not sufficient depth of water for the boats, and "the construction of this lock was the shortest and readiest means of over-"coming the difficulty.

"41st. Though increased facility of bringing supplies down to the aque-"duct was thus the object in view when this lock was built, and it was in-

"tended at the time as merely a temporary measure, yet its construction is of "a sufficiently permanent nature to enable it to last for many years, in fact "as long as any of the other locks, and it may thus be regarded as a perma- "nent improvement to the navigation of the channel.

"42d. I have thus stated the particular reasons which I think may "be assigned for the excess in each portion of the work. The three main "causes undoubtedly were, the want of time for preparing and collecting "materials beforehand—our inexperience in brick burning, and the great "waste of cooly labour from the insufficiency of European superintendence.

"43d. It remains for me to notice the services rendered by the subor- "dinate European and native superintendents in the course of the work.

"44th. Overseer Sage, was in charge of the brick ground for about "three months, after which he was transferred to the Kistnah Anicut staff. "He was a very great help to me in every way incessantly at work both "night and day, his zeal, activity and intelligence contributed largely to the "success of the work.

"45th. He was succeeded by Overseer Bevan, of the value of whose "services I cannot speak too highly. He was of the greatest assistance to "me and introduced several improvements in the mode of burning the bricks.

"46th. Overseer Finnigan was also employed on the aqueduct for a "short time and made himself very useful.

"47th. Among the natives and indeed among all the subordinates em- "ployed on the work, I. Achoota Naidoo the Maramut superintendent of this "division is the man to whom I am most deeply indebted for the assistance "he afforded in the construction of the aqueduct. I cannot adequately ex- "press the sense I entertain of the value of his services. To his talents, "experience, and unwearied activity, the successful completion of the work "is undoubtedly mainly owing. He superintended all the work in the bed "of the river. I constantly consulted him, and frequently received from "him, most valuable hints and suggestions.

"48th. V. Veerannah the head writer of the Civil Engineer Department "also rendered most essential services in procuring supplies of all sorts both "of materials and workmen.

"49th. With perhaps one exception the Amuldars generally were parti- "cularly useless.

" *Memorandum of the time occupied on the several points of the Aqueduct.*

" Sanction for the estimate arrived in December, the 1st preparations for " the work were commenced in the latter end of that month, brick-making in

“ middle of January,—by the end of which month the river was banked “ out, and the work commenced in its bed. During February very little progress “ was made, in consequence of the failure of the brick-kilns,—in March we “ got on better, and by the 22d May the last arch was turned. The flooring “ and apron were then commenced, and had on the 24th June been completed “ as far as the 38th arch, when the river rose, carried away the bunds, and “ passed through the work—Providentially no accident occurred. The cross “ wells had been sunk in the bed under the last 11 arches, and some loose stone “ thrown round the piers, and this protected them from any injurious action of “ the water. A subsequent fall of a few feet in the river enabled us to cover “ over all this part of the flooring with a layer of loose stone packed ; and it “ has sustained no injury whatever from the last high flood in August.”

“ The side walls had also by the middle of June been built to a height of “ 2 feet, about ⅓d of the length of the bridge, and the backing of about ¾th of “ the arches was completed.”

“ They are now almost finished and there seems every probability of the “ work being ready for the water in a fortnight.”

(Signed) F. T. HAIG, Lieut.
1st Assistant Civil Engineer Godavery Division.

22d September, 1852.

32d. The estimate was evidently made on too low data, and under an impression that every one engaged would work with the same talent, zeal, and energy, as the executive Officer, and his 3 or 4 European and Native aids. Whereas the fact was, that he had the most idle, ignorant and feeble race of people to work with that are to be met with in the South of India. His whole strength depending on the numbers that could be collected, and the ability with which he and his assistants could apply their labour,—such as it was.

33d. In forwarding Mr. Haig's Report, I wrote the subjoined letter to the Secretary to the Board of Revenue—which I enter here, because it contains all I need say further on the subject of this interesting work, which, if it had effected nothing else, would have been worth its cost, as a standing proof how great resources are at hand, wherever energy can be found to turn them to account. Nothing could be more unpromising than the resources placed at Mr. Haig's disposal ; but Colonel Cotton determined that the work must be done, and Mr. Haig, acting in the same spirit, carried his plan into execution, and such would be done no doubt in every district of the Presidency where men of like determination were called upon to act. For this was not done in a collectorate otherwise at rest ; on the contrary, other extensive works were everywhere in progress, engaging daily not less than a tenth part of its population.

No. 281.

To

THE SECRETARY TO THE BOARD OF REVENUE,

Department Public Works.

SIR,

* * * * * * *

7th. The principal work in progress is the Gunnarum aqueduct, which has greatly exceeded its anticipated cost for reasons shown by Mr. Haig in a most clear and correct report, which I also do myself the honor to enclose.

8th. Mr. Haig who has conducted this great work through its extraordinarily rapid execution, considers it difficult to account for so large an excess above the expected cost; but I consider that the reasons he has given, are sufficient to account for it, and I am sure that when the extent of the work, its position, the distance a great portion of the materials used had to be carried, the insufficient aid in subordinate superintendence, and more than all the rapidity with which the work was executed are all fairly considered, it will be found at its whole cost, a wonderfully cheap work.

9th. If it was possible that the aqueduct could have been built for the estimated sum, it must have been by the sacrifice of a year; but even with the loss of profit that such a less delay would have entailed, it is hardly possible to suppose that yard by yard it could have been constructed as economically as a lock or Calingulah of the ordinary size, though the same data was used in the preparation of the estimate, that would have been used in calculating the probable expense of the smallest works.

10th. Your Board have before you the bills of the great bridges on the Coleroon and Cauvary, which are undoubtedly cheap works. Let a comparison be drawn between their cost, and the outlay on the aqueduct, and I feel sure that it would be found that the excess of the bill above the estimate is fairly to be accounted for.

11th. The aqueduct is situated in the centre of the delta, and the materials of which it is built are bricks, stone and hydraulic lime. The soil was not well suited to brick making, and it was only after continual trials and losses that the bricks turned out fit for use. Had there been more skilful brickmakers, so great losses would not have occurred, and in Tanjore no such expenditure on trial would have been necessary.

12th. The foundations of the aqueduct were laid in sand, with the vast additional expense entailed by the rise and fall of six feet tide. The stone used was carried thirty one miles, the lime thirty eight miles, and the fuel with which both the lime and bricks were burnt, had to be procured from fifteen to twenty five miles from the kilns.

13th. To complete the aqueduct in a single season, it was necessary to employ vast numbers of men, and for their management, there was a most insufficient number of Overseers, while individually, the maistries, bricklayers, and coolies are vastly inferior in activity as well as intelligence to those of the southern districts.

14th. But the rapid execution of the work may be said to have been the first cause of its cost being greater than Colonel Cotton anticipated. Had a year been spent in the preparation of materials, their price might have been greatly reduced. The steam Engine which it was expected, would reduce the expense of baling to a very moderate sum, appears to have failed from a fault in the fire place which could have been corrected had the time admitted of it, but days could not be spared, and it was necessary to employ instead manual labour.

15th. To make the most of every day, it was indeed necessary to do every thing by great numbers of men, almost all of whom were utterly ignorant of the meaning of the work they were engaged on, and only to be profitably employed by the constant and immediate direction of Mr. Haig, and the three or four subordinates, on whose activity he had to trust.

16th. The reduction of the executive establishment while the work was in progress, to supply officers for the works on the Kistnah, was another cause of loss. Mr. Haig had not a sufficient subordinate agency in any part of his vast operations. And though the highest possible credit is due to the Overseers employed as well as to the superintendent for their unbounded zeal and good ability, they could not give their attention to works beyond their reach. There must have been losses everywhere on this account, and the total sum would be found if it could be traced, to form no slight portion of the excess.

17th. To save time was Mr. Haig's great object, and his success was perfect. In 4 months from the laying of the first stone, the 49th arch was keyed, and in 2 months more, the whole work was submerged by one of the very highest floods ever known in the Godavery, without its sustaining any injury.

18th. The work when completed will, it is now estimated, cost 1,68,991 Rupees or 70 Rupees for each running foot ; and it must be remembered that it is not a simple bridge like those with which I would compare it, but capable of carrying a canal to be navigated by large vessels, drawing five feet water, with a broad towing path, and giving a discharge sufficient to irrigate 80 square miles of land. Considered in this way it must be admitted that it will be a curiously cheap work, and it is only to be regretted that the estimate was not higher.

19th. How far the additional cost caused by the expedition with which the work was built, is to be justified by the return to be yielded by it, can be readily calculated by the extent of cultivable land in the Nuggaram talook, the whole of which will derive an ample supply from this work, when completed. And by such a calculation it will be found that the annual value of the water conveyed by it, will be to the Government and the cultivators, far greater than the whole cost of the work, I might have said four times this sum, as the value of the water if used for rice only, will be 640,000 yearly.

20th. I need not bring to the notice of your Board, the wonderful energy of the young executive officer who has conducted from first to last this astonishing work, but I must be allowed to say that the gain of Mr. Haig's services for the coming year will, in my opinion of itself repay no slight portion of the excess of expenditure occasioned by the haste with which the Gunnaram aqueduct was built.

21st. The aqueduct is now so far completed, that the channel will be brought into it in a few days; and the crops now on the ground in Nuggaram talook will derive immediate benefit from the work; but the towing path has yet to be made, and the side walls to be raised to their full height. An estimate for the remaining work is enclosed, made out by Mr. Haig on the data derived from the work executed; not on the average of the whole work, but at the rate at which he found that he could work at the close of the season, when the experiments had been tried, and the difficulties overcome, which made the former portion of the building so much more expensive.

22d. The sum requiring sanction amounts to 95,781 Rupees.

23d. Since the month of August some work has been done, but the accounts for September are not yet closed.

I have, &c.

34th. The state of the Godavery works at the end of the year 1852 cannot be given with any accuracy; not one of the systems of works was complete, but the whole delta was in activity. A detailed account of the progress of each of the subsidiary works has not been obtained, and a description of each of them is more than I can find time to give, while I am so much occupied with more essential duties.

35th. In the report upon the state of the division in 1853 I hope I may be able to give an account of the works, with some details as to their use and extent, as I am trying to put this information together in the form of a catalogue of the channels; but the frequent removals of the executive officers and want of leisure at any season of the year, now that the works are continued from January to December, makes it very difficult to collect and arrange any account of the works, undertaken as they were by different officers at different times, and taken in hand as circumstances permitted.

36th. In 1852 the steamers continued to work throughout the year, with the exception only of those few days, or I should rather say hours, of extreme fresh in the river, when their want of sufficient power rendered it impossible for them to cross. When the great fresh rose in September, and destroyed the Weyjaiswaram Lock wall, they did contrive to make good their passage, by ascending the river over the flooded lands on the Eastern bank, and by their means we were able to throw a stone dam across the Lock bridge and reduce the discharge of water through it, till the stream was harmless.

37th. The district above the reach of the anicut has had no attention paid to it by the Civil Engineer Department; though from the little I have seen of its capabilities and soil, I feel sure that it may be made one of the finest Tank Countries in the Peninsula of India. Where water is procured from wells, as it is in the vicinity of Peddapoor, the produce of sugar is very great, and there seems no reason why the upper talooks of Rajahmundry should not be highly irrigated. On the West side of the Godavery, the Yerra Calvay, and on the East, the Yellairoo, are streams which rarely, if ever are known to fail altogether, the former draining 900 square miles, and the latter 600 miles of country, much of which is hill and forest, and consequently very favorable for a secure supply of water. Further to the Westward, the Toomoolair frequently pours a great surplus stream into the Colair, and through the Colair into the sea, which is worse than valueless.

38th. At present, some use is made of the Yellairoo and the Toomoolair, but very little is done with the water of the Yerra Calvay, while the heavy freshes in all, are the cause of most destructive inundations. In the control of these streams, there is ample occupation for several officers, but at present my hands are too full to attempt any thing beyond the delta.

39th. The ports of the division all require attention. Coringa Bay has now a promise of improvement, but up to the end of 1852 nothing of importance had been done. There is one improvement of the Bay which should be kept in mind, and for which nothing as yet has been suggested. The bay is every year silting up with the deposits from the Godavery, which are carried into it by several channels of the river; but the greatest quantity,—by that branch which leaves the Godavery between the towns of Ingeram and Yanam. This and indeed all the branches of the river leading into the bay, ought to be closed, a passage to the river being kept open by a lock.

40th. Another improvement also suggests itself, from the form of the coast, and the progress of the delta. It is clear that the present main stream of the Godavery is forming its chief deposits to the northward, and the tendency of that is to close the bay. The following outline sketch of the delta will show that such is the case; and it will be equally evident that if the deposits in the bay could be reduced, while the stream of the Godavery was led to the eastward, the form of the coast would every year be improving; a more projecting head-land being thrown out, a deeper bay, and better shelter for shipping.

41st. There is already a branch from the Godavery falling into the sea near Kothapaulem which, if straightened in its course, would be precisely what we require; and from the sides being both perpendicular, it is evidently widening with the tide and freshes. At the outlet of this branch, there is 18 feet of water, and if it was not for its exposed position, it would be by far the best site for a shipping port. Under the present circumstances however, it would be better to encourage the widening of the stream, and look to it's eventually becoming the main channel of the Godavery, and when I can spare labour for the purpose, I will suggest the course of this branch being straightened.

42d. To show that such a change may be effected in a few years, we have the case of the Vyanathaem Godavery which 50 years ago was not unlike in character to the stream I am speaking of. At that time, the water over the bar was so deep that large vessels could enter, though the breadth was so inconsiderable that it did not mark the boundary of the talook; and there are now several villages belonging to Nuggaram, separated from the rest of the talook by a river ¾ of a mile in breadth, while the water in the bar is as shallow as it is at the outlet of all the large branches of the Godavery.

43d. While so fully occupied in the delta and with the prospect of the upper Godavery navigation works before me I need not go further into the wants of my division. I must however bring again to notice the great advantage that the trade of the country would derive from the use of steam ferries. I would suggest their use on all the crossings of the different branches of the Godavery between Cocanada and Bunder, as an improvement urgently called for and one which might be carried out without interfering with the works in progress.

44th. Returns of trade for last ten years will be furnished with the reports for the year 1853.

F. C. COTTON, Major,
Civil Engineer Godavery Division.

Civil Engineer's Office, Godavery Division,
Rajahmundry District, Camp at Nursapoor,
15*th April* 1854.

Memo. of boat traffic on the Thoolia Bagah Channel during the year 1852.

Month.	Boats.	Rafts.
	No.	No.
January	36	59
February	45	60
March	45	143
April	57	198
May	131	83
June	104	71
July	168	114
August	110	3
September	107	5
October	182	31
November	152	11
December	133	31

Civil Engineer's Office, Godavery
Division, Camp at Nursapoor,
15*th April*, 1854.

F. C. COTTON, Major,
Civil Engineer Godavery Division.

REPORT ON THE IMPORTANT WORKS EXECUTED IN THE 2ND DIVISION DURING THE YEAR 1852.

1. One of the most important works executed during the year 1852 in the Nellore District, and classed under the occasional head, is a Light House built at Mourpolliem and fitted with a lantern complete at a cost of Rupees 3,777–4–11. The basement and foundation were completed in the year 1851, and the shaft and subsidiary works built in the succeeding year. With the exception of a few trifling repairs required to steady the light, this building has stood well, and answers the purposes for which it was intended. A build-

ing for the superintendent has been sanctioned in connection with this Light House, and the materials for it are now in course of preparation. With regard to other works the two arch bridge sanctioned for the Gungapatam channel was commenced, and a portion of the foundation completed, when the October flood damaged and widened the channel to such an extent that the work was abandoned until a fresh estimate allowing an increased waterway could be prepared. I may mention that I have prepared this estimate with one to accompany it for a head sluice to the channel, and as the Collector of Nellore has detained them I hope my successor will forward them on for the Board's approval. New Talook cutcherries have been built during the year at Nellore and Enamanamellore and also a salt cutcherry at Beerungontah. These buildings are well built and are a great improvement on the old ones. A one arch bridge over the Covoor channel on the road to Cuddapah was completed and has proved of great service in opening the communication on the line to Cuddapah—a one arch bridge also, to allow of increased waterway was built on the main road between the Nellore jail and Fort gate. With regard to civil buildings, an additional room to the session judge's court was completed and also a record room, both of the buildings having been carefully superintended and efficiently built. Besides these works, some of minor importance have been carried out such as the repairs of a few of the public bungalows on the northern road. The total occasional works sanctioned amount to Rupees 99,886–11–6 and the work actually carried out amounts to Rupees 18,034–14–1.

2. The ordinary works during the year which were executed cost Rupees 30,104–7–6 out of a sum of Rupees 37,509–8–0 sanctioned for them, and in which amount Rupees 1,548–15–0 had not been disbursed owing to works to that value not having been commenced. Amongst these ordinary works, the most important may be mentioned, as the repair of the earth and stone work of the Alloor tank and of the supplying channel and tanks of Anamacondah and Nellore. To these may be added the repair of the breaches of the Dagadurty Murrypaud and Poolairoo Tanks, inspected by Major DeButts, and the repair of the Vagoor channel. The works under the ordinary head it will be seen were chiefly prepared for the purpose of restoring the works, and securing the existing collections, and not for the purpose of increasing the revenue, though the efficient repairs of these irrigation works have doubtless to a certain extent effected this latter object, as for instance in the case of the Vagoor channel which feeds 5 tanks and has increased in one instance the revenue of the village of Aleganepaud from Rupees 1,278 to Rupees 1,882.

3. In Cuddapah district the occasional estimates amounted to Rupees 44,402–15–4, in which the sum of Rupees 13,945–9–1 was expended. Large

sums out of this amount were spent in repairing and improving the anicuts. One sum prepared by Major DeButts amounting to Rupees 3,624, was sanctioned for the extension of the Panta Cuddapah anicut and the work was completed. The Wootcoor and Linganah Calvah anicuts also in the vicinity of Cuddapah were repaired under the superintendence of the assistant Civil Engineer. With regard to revenue buildings, the Hoozoor treasury at Cuddapah, and the Camalapoor talook Cutcherry were repaired and a new prisoners' room for the Chemoor talook Cutcherry built. A new tank which had been sanctioned at Baukrapett in Sidhout talook and the sluice also were completed this year. Though an ordinary estimate had been prepared for repairing the bank previous to the heavy rains, the tank otherwise was in good order and nothing remained to secure cultivation from it but the excavation of a new channel from the sluice. Occasional estimates were also framed for repairing the Agraharum and Machepully tanks, also the Parnapully channel, and the work was in progress during the year.

4. The ordinary estimates for this year amount to Rupees 24,212-2-0 and the sum of Rupees 20,327-0-11 in this amount has been expended. These works are not of very great importance, and do not demand any particular report on them. The principal repair consisted in stopping the leak in the Cumbum tank sluice, and by throwing up a temporary bund this was effected at a cost of Rupees 1,566-2-0, a few large channels such as the Peddapootta, Anantapore and Paurnapully channels were cleared out, and the Kundakoor anicut repaired. The Appiapully bank near Camalapoor was also protected by turfing, but the whole of this bank was subsequently carried away.

5. The roads which have been constructed in the two districts during the year have not been of any extent and in the Cuddapah District the cause may probably be traced to the want of European superintendence, as large estimates were sanctioned for the repair of the Madras road, the Cumbum and Cuddapah Road, and the Nundy Canama Pass. In Nellore District the first mile of road from the Vagoor bridge in the direction of Cuddapah, being about 1½ miles in distance from the town of Nellore, was constructed and some road Tunnels. This road being almost impassable in the wet weather the construction of the line so far was a great improvement, but the unprecedented fresh of October in the Pennaur River completely destroyed portions of the communication. The road however and masonry works have been repaired this year, and also gravel laid down, and the line therefore will soon be open for general traffic. This is only a commencement of the line to Cuddapah along the Pennaur River North bank, and it is highly desirable that the work throughout should be gradually pro-

ceeded with as there is no made road throughout the line. In Cuddapah Distrct the portion of the road from Cuddapah to Chennoor and for a short distance beyond the Pennaur River, which was sanctioned by Government in an estimate amounting to Rupees 9,163-6-0, and which embraces a length of 4 miles, was commenced in August of last year, and the earth work had been satisfactorily progressing when the October flood covered the ground with water, and impeded the work. The road has however been since carried out and the work was in fair progress when I inspected it in March of this year. This forms the first portion of the road to Cumbum which is in a disgraceful state throughout and much in want of repair. Besides the above estimate a sum of Rupees 387-1-0 was sanctioned for repairs and the work is in execution. The Board of Revenue are aware that the other road works are delayed for the present.

6. I regret that I am unable to give the cost of the Civil Engineer's Establishment* for the last 10 years, as Major DeButts did not keep copies of the Civil abstracts of his Department for reference in the Office.

* In 1852, Rupees 18,720-13-4

7 The number of works inspected by the Civil Engineer's Department during the year was 431. Major DeButts from the 19th of March to 21st May superintended the Cumbum* Tank work, and for the rest of the year was employed in the general duties of the district inspecting works. Lieutenant Hemery from January to June superintended the Goolcherroo Ghaut, and also gave his attention to the Panta Cuddapah, Wootcoor, and Linganah* anicuts, after which date he left the district. Lieutenant Moberly in the months of June, November, and December, was employed in examining works and for the other period of the year chiefly superintended the Cuddapah anicut works and Chennoor Road.

* Rupees 1,566-2-0.

* Rupees 312-12-0.

8. I have already mentioned that estimates amounting to Rupees 24,968 have been sanctioned for roads in Cuddapah exclusive of Rupees 9,550-7-0 for the Cuddapah and Cumbum Road. It is highly necessary that these should be taken in hand as early as possible, in order that the communication through the district may be greatly improved. Portions of the Cuddapah road exclusive of the Chennoor portion were carried out last year and as soon as the whole is completed and bridged the communication will be opened, and may be extended from Cumbum to Kurnool by means of the Nundy Canama Pass. I believe the first portion of road from Cuddapah to Madras is in about as wretched a state as it is possible to conceive, and the amount allowed should be disbursed as soon as possible. Lieutenant Hemery having opened the Goovelcherroo Ghaut, the great difficulty in the district regarding this Madras line through Chittoor is removed, and the road beyond requires repair in the limits

of the Cuddapah district. My own experience in these districts, derived from a 5 months residence, will not allow of my presenting a detailed account of the state and prospects of that district and division. From what I have seen of Cuddapah it appears that the communications throughout are in a wretched state though improvements are being made. The Government have sanctioned lately an estimate amounting to Rupees 16,296-6-10 for opening 14¾ miles of the road from Cuddapah to Nellore including the Doranella pass, and it will be of great importance to continue the repairs as far as Nellore or to within 1¾ miles of that town. The traffic on the line as pointed out by the Board of Revenue is very great. An indigo planter is stationed at Budwail which is a centre point of a portion of the Indigo factories in Cuddapah, and on the line of road; this gentleman informs me, that, as soon as the road is open and the means of traffic facilitated, the quantity of indigo exported will greatly increase. The Nellore district, as Cuddapah itself, is destitute of good roads. The northern trunk road is under the road department, and is being repaired throughout under an Officer's superintendence. I think that branch roads from this trunk line to the coast are desirable, for instance from the main line to Eskapully where a great portion of the salt in the district is exported, also treasure shipped to Madras; also a branch to Kistnapatam from Nellore which will not only open out a local communication between the villages on the line, but facilitate the export of such goods as are generally conveyed along the coast from Kistnapatam in the country crafts. It must however be remembered that the extension of the canal as far as Doogoorazapatam is in progress, and when this is completed throughout, this water communication will form the principal line of outlet for the goods of the district.

9. The irrigation in the district does not appear to have increased to any extent of late, as the works have not consisted generally of projects for the extension of the cultivation, but principally of repairs made to preserve the existing channels, masonry and earth works. The extraordinary flood of October 1852 created much damage to the works of irrigation which were in any way connected with the Pennaur River, and it will take two years from that date to repair many of the Tanks and channels. I consider that a great deal of the damage was occasioned by there being no Head Sluices to the various channels, and that in many cases these are highly desirable where I have seen a channel which has gradually widened out year after year, and required annual sums expended for the removal of deposits from the river which have filled the beds. The materials for the Pennaur anicut were in course of collection last year and a portion of the anicut has subsequently been built. On its completion the increased supply which will be received into the Jaffer Sahib and other channels affected by this work, will irrigate new ground and increase the revenue of the district. The estimates for the subsidiary works connected

with the anicut have not been prepared, and it is desirable that some attention should be given to their preparation.

10. In the absence of reports from the collector of Cuddapah and Nellore on the increase of revenue in the division from works lately carried out, I am unable to furnish the particulars on many points referred to in the extract of the proceedings of the Board of Revenue under date 17th March 1853 No. 214, but I have considered it better to send in this report previous to my departure from the district, as the returns which I applied for can be forwarded hereafter.

J. BEAN,

1st Assistant Civil Engineer 2d Division in charge.

Civil Engineer's Office, 2d Division,
Nellore, *5th September*, 1853.

Statement shewing the increase of Bariz derive

Talooks.	Villages.	Name of Works.	Date of Sanction.
Nellore.	Nellore	Opening a supplying channel to the tank and building sluices, &c.	Sanctioned by Government, 6th March 1848. Do. 27th do. Do. 16th do. 1849
Talamunchy.	Parlapuly &c., Villages	Opening a river channel and building aqueducts.	Do. 17th January do.
Survapully.	Coollycoodooroo, Cuttoovapully and Budvail.	Building annicut to Condlair river for the irrigation of wet lands.	Do. 2d March 1848.........
	Goorivindapoody	Repairing the supplying channel.	Do. 17th October 1848....
Sungaw.	Viroor, &c	Opening a new mouth to the river channel.	Do. 24th November 1846.

REPORT UPON THE PRINCIPAL WORKS EXECUTED OR SANCTIONED IN THE BELLARY DISTRICT, DURING THE YEAR 1852.

1. I now proceed to notice the principal works that were executed or sanctioned in the Bellary district during the year 1852.

2. During this year a most desirable impetus was given to the department of Public Works in this district by the necessity that existed for restoring the works that had been ruined in 1851. It was necessary that they should be brought into an efficient state with all speed to prevent a serious failure in the Revenue, but the works were so numerous and so widely scattered, that the ordinary resources of the District failed to produce sufficient work-people. In this emergency great exertions were made by the Collector's department. All the available wudders were soon employed and emissaries of this class of people were sent to the neighbouring districts to induce others to come to our assistance. These people took advantage of the occasion to demand higher rates than usual for their labour. Their demands were generally acceded to, to prevent delay, and in a short time a large number of works were commenced upon and carried on simultaneously with as much vigour as the means at our disposal would admit of—nor were the Government wanting. An additional establishment was given to the Collector's Department and an extra assistant and a temporary establishment were placed at my disposal to assist in the duties of the Civil Engineer's department.

3. On the 17th February 1852 of this year sanction was received for the restoration of the Darojee and Sinjanamalla tanks. The delay caused by the reference to Bengal is to be regretted, but it was unavoidable according to the strict letter of the law on this subject. It caused the loss of a working season and of a year's revenue from each of the tanks. It was also a great discouragement to the ryots who despairing of their tanks being repaired, betook themselves to other localities in search of means of livelihood, and finally it caused a loss to Government in the case of the Darojee tank of Rupees 6,481–15 being the value of work that was carried away by a flood in September and October 1852 whilst the work was in an early stage of progress. This would not have happened had the work been commenced at once without waiting for the reply from Bengal, as in this case the work would have been beyond the reach of danger before the storm took place.

4. On the receipt of the sanction no time was lost in collecting materials for these two works, and the following statement will shew the result of the year's operations upon these, as well as upon the other works of irrigation brought specially under review in my report for last year.

Names of the Work.	Amount of Estimate sanctioned.		Work performed.						Balance of Estimate and probable remaining cost.		Probable time to complete.
			Up to December, 1851.		Up to December, 1852.		Total Work performed.				
Darojee Tank.........	37,998	0	1,397	0	11,478	3	12,875	3	25,122	13	1st Jany. 1854.
Sinjanamalla Tank..	60,500	0	4,370	0	21,081	11	25,451	11	35,048	5	31st Dec. „
Anantapoor Tank...	9,536	7	3,530	15	3,894	14	7,425	13	2,110	10	1st Jany. „
Hunshy Tank.........	10,344	10	4,507	10	4,308	14	8,816	8	1,528	2	31st May „
	1,18,379	1	13,805	9	40,763	10	54,569	3	63,809	14	

5. In addition to the above works the following important works of irrigation were sanctioned and undertaken during the year 1852 viz. the restoration of

The Avinmudoogoo Tank.

6. This work was breached in 3 places in 1851, and as it is situated immediately above Darojee, I believe the overwhelming disaster at the latter place is due to the sudden influx of the water from Avinmudoogoo when the bund was carried away. The amount of the estimate for securing the work is Rupees 7,927-9. The quantity of work done during the year amounts to Rupees 1750, and the probable remaining cost is Rupees 6,177-9.

The Rampoor Anicut.

7. This work constructed across the Toombudra was so extensively damaged in 1851 that an estimate of Rupees 5,003-14 was prepared for its restoration to efficiency. During the year work to the value of Rupees 3,125-13 was performed, leaving a balance to complete of Rupees 1,878-1.

8. A summary of important works in hand in 1852 for the restoration of the irrigation in the district is shewn in the following table.

Amount of Estimate sanctioned in 1851.		Amount expended in 1851.		Remaining incomplete from the Estimate of 1851.		Add amount of Estimates in 1852.		Total.		Amount expended in 1852.		Remaining incomplete on the 31st Dec. 1852.		Remarks.
162,720	9	33,935	13	128,784	12	32,554	5	161,339	1	70,093	9	91,245	8	

ROADS.

Dharwar Road.

9. Besides the estimate amounting to Rupees 28,744–15 sanctioned in last year, another estimate for the same road amounting to Rupees 11,489–4 received the sanction of Government on the 17th of February 1852. The latter estimate provides for the repair of the earth and masonry work of the portions of this line made between the years 1844 and 1850 and alluded to in the 14th para. of my report for last year. The total of the two estimates sanctioned amounts to Rupees 40,234–3, and the amount expended during the year is Rupees 7,280, leaving a balance of Rupees 32,954–3 for the completion of the works.

10. The expenditure has been made entirely upon earth work, and the collection of a very few materials for the drains.

Heeryhall Road.

Amount of estimate Rupees 21,000.

11. During this year work to the value of Rupees 7,024 has been performed to the road leaving a balance of Rupees 13,975–11–0 for completing the work. This amount was expended chiefly upon earth work and the collection of materials for the drains and bridges.

Ramandroog Pass.

12. An estimate for the improvement of this pass originally constructed by private subscription received the sanction of Government on the 16th April 1852. It amounted to Rupees 647–3–10, but the importance of the work ought not to be measured by the amount of this estimate. It is a most serviceable work and will not only be of immense advantage to the Sanatarium, but will repay to Government more than cent per cent upon its outlay by the saving that will be effected in the transport of materials for the construction of the Barracks alone, besides the facility it will afford for the conveyance of stores to and from Bellary when European troops are stationed on the hill. The amount expended on the pass in 1852 is Rupees 567–11–10, leaving a balance of Rupees 79–8–0 to complete the work which ought to be effected by May 1853.

13. On the 7th September of this year the estimate amounting to Rupees 57,050–13–4 alluded to in my report for 1851 for the construction of a 1st class road between Bellary and Anantapoor was forwarded on the 7th September 1852 to the Superintendent of Roads, and by him submitted to Government, but it met with the fate already mentioned. This notice is necessary to account for the employment of this department. The amount of labour in surveying this road twice over, in calculating the estimate, and in

preparing a large number of plans for bridges and drains was very considerable, and it is to be regretted that it should have been undertaken to so little purpose.

Bridge of 3 Arches across the Anantapoor tank surplus stream on the Bangalore Road.

Two estimates amounting together to Rupees 2,171–6–7.

14. Of this sum Rupees 618–9–0 have been expended during the present year leaving a balance of Rupees 1,552–13–0 to complete the work. The foundation was laid and the piers partially built on the above sum. The restoration of the old bridge alluded to in my report for last year has not been commenced.

The following statement exhibits the road work performed in 1851 and 1852.

Name of work.	Amount of estimate in 1851 and 1852.		Amount expended up to December 1852.		Balance of estimate.		Probable time to complete.
Dharwar road… ……	40,234	3	7,280	0	32,954	3	31st December 1855.
Bangalore road. …….	21,000	0	7,024	5	13,975	11	31st December 1854.
Ramandroog pass. ….	647	3	567	11	79	8	May 1853.
Bridge of 3 arches across the Anantapoor tank surplus tream on the Bangalore road…	2,171	6	618	9	1,552	13	31st December 1854.
	64,052	12	15,490	9	48,562	3	

Revenue Buildings,—Hoozoor Cutcherry.

15. Amount of estimate Rupees 8,004–8–0 during the year a further sum of Rupees 3,409–2–0 has been expended upon this work making a total up to 31st December 1852 of Rupees 5,248 and leaving a balance on the estimate of Rupees 2,756–8–0.

16. Two new estimates were sanctioned under this head during the year under review amounting together to Rupees 5,932. One amounting to Rupees 2,432 was for a Travellers' Bungalow at Herahall on the road from Bellary to Bangalore upon which a sum of Rupees 209 was expended during the year,

leaving a balance of Rupees 2,223-0-0 to complete the work, and the other amounting to Rupees 3,503 for a talook cutcherry at Alloor in the Goollium talook which was not commenced during the year.

17. The total work in hand during the year under the above head may be shewn in the subjoined tabular statement.

Names of Work.	Amount of Estimate.		Amount expended up to December 1852.		Balance of Estimate.		The probable time to complete.
Hoozoor Cutcherry....	8,004	8	5,248	0	2,756	8	31st December 1853.
Travellers' Bungalow at Horahall.	2,432	0	209	0	2,223	0	31st do. do.
Goollium Talook Cutcherry	3,503	0	0	0	3,503	0	31st do. do.
Total...	13,939	8	5,457	0	8,482	8	

The following Tabular statement contains an Abstract of the particulars included in the above report upon important works for the year 1851.

Names of Work.	Amount of Estimate.		Amount expended up to December 1851.		Balance of Estimate.		Remarks.
Darojee Tank....................	37,998	0	1,397	0	36,601	0	
Singanamalla Tank	60,500	0	4,370	0	56,130	0	
Hunshy Tank	10,344	10	4,507	10	5,837	0	
Anantapoor Tank	9,536	10	3,530	15	6,005	11	
Dharwar Road	28,744	15	0	0	28,744	15	
Bangalore Road	21,000	0	0	0	21,000	0	
Bridge of 3 arches across the Anantapoor Tank surplus stream on the Bangalore Road................	2,031	6	0	0	2,031	6	
Bellary Hoozoor Cutcherry ...	8,004	8	1,839	1	6,165	7	
Raidroog Talook Cutcherry .	2,327	11	2,315	15	11	12	
Bellary Talook Cutcherry	4,946	3	657	11	4,288	8	
Total...	1,85,433	15	18,618	4	1,66,815	11	

The following table shows the state of the works in 1852.

Names of Work.	Balance of Estimate remaining unexecuted in 1851.		Add estimate sanctioned in 1852.		Total.		Amount expended up to 31st December 1852.		Balance of estimate on the 31st December 1852.		Remarks.
Darojee Tank	36,601	0	0	0	36,601	0	11,478	3	25,122	13	
Singanamalla Tank	56,130	0	0	0	56,130	0	21,081	11	35,048	5	
Hunshy Tank	5,837	0	0	0	5,837	0	4,308	14	1,528	2	
Anantapoor Tank	6,005	8	0	0	6,085	8	3,894	14	2,110	10	
Avinmudoogoo Tank	0	0	7,927	9	7,927	9	1,750	0	6,177	9	
Rampoor Annicut	0	0	5,003	14	5,003	14	3,125	13	1,878	1	
Dharwar Road	28,744	15	11,489	4	40,234	3	7,280	0	32,954	3	
Bangalore Road	21,000	0	0	0	21,000	0	7,024	5	13,975	11	
Bridge across the surplus channel of Anantapoor Tank	2,031	6	140	0	2,171	6	618	9	1,552	13	
Ramandroog Pass	0	0	647	3	647	3	567	11	79	8	
Bellary Hoozoor Cutcherry	6,165	7	0	0	6,165	7	3,409	2	2,756	5	
Bellary Talook Cutcherry	4,288	8	0	0	4,288	8	955	8	3,333	0	
Raidroog Talook Cutcherry	11	12	0	0	11	12	8	4	3	8	
Travellers' Bungalow at Herahull	0	0	2,432	0	2,432	0	209	0	2,223	0	
Goollium Talook Cutcherry	0	0	3,503	0	3,503	0	0	0	3,503	0	
Old Bridge of 3 arches across the surplus stream of Anantapoor Tank	1,850	0	0	0	1,850	0	0	0	1,850	0	
Total...	1,68,665	8	31,142	14	1,99,808	6	65,711	14	1,34,096	8	

The following statement shews the employment of the Civil Engineer's Department during the year 1851 and 1852 respectively.

For 1851.

Name.	Number of works inspected.	Amount of estimates prepared.		Amount expended under each officer's superintendence.		Remarks.
Major R. Henderson, C. B. Civil Engineer...	186	237,126	7	0	0	The department was chiefly employed in inspecting works and preparing estimates and not in the immediate superintendence of works.
Lieut. Bean, 1st Assistant Civil Engineer...	123	57,623	11	0	0	
Mr. A. P. Kemp, Assistant Surveyor..........	43	10,331	13	0	0	
Mr. M. H. Beahen, Assistant Surveyor......	160	31,480	11	0	0	
Mr. R. A. Ross, Assistant Surveyor..........	84	1,365	8	0	0	
Total...	596	337,928	2	0	0	

For 1852.

Name.	Number of works inspected.	Amount of estimates prepared.		Amount expended under each officer's superintendence.		Remarks.
Major R. Henderson, C. B. Civil Engineer...	131	94,846	13	3,129	0	From the number of works requiring to be estimated but few could be superintended by the officers of the Civil Engineer's Department.
Lieut. Bean, 1st Assistant Civil Engineer ...	121	43,113	9	10,296	5	
Lieut. Mullins, 2d Assistant Civil Engineer	0	0	0	8,635	5	
Mr. A. P. Kemp, Assistant Surveyor..........	38	4,322	15	0	0	
Mr. M. H. Beahen, Assistant Surveyor......	114	10,332	11	0	0	
Mr. R. A. Ross, Assistant Surveyor..........	52	3,369	7	0	0	
Total...	456	155,985	7	22,060	10	

18. The principal rivers which either intersect or skirt the Bellary district are

1st. The Toombudra.
2d. The Pennar.
3d. The Huggry or Vedavutty.
4th. The Chinna Huggry or Janaganahully River.
5th. The Chinna Huggry in the Hoovinhudgally Talook.

Besides other smaller streams and Nullahs which will be noticed hereafter in this report.

19. The *Toombudra* forms the boundary of the district to the North and North West to an extent of about 160 miles. Across this river 9 anicuts constructed by former Native Governments are now in operation, and yield an annual revenue to Government of nearly 1½ lac of Rupees. These works are constructed of large masses of stone put together without cement with the exception of the one at Wallubapoor which is built of solid brick and stone masonry in chunam. All of them are generally in good order though requiring slight repairs every year as some of the component stones are liable to be displaced by heavy freshes. The amount expended in annual repairs to these anicuts is Rupees 5,651 calculated from an average expenditure of 10 years.

These anicuts are as follows, viz.

1. Wallubapoor Anicut.
2. Rumanagudda...do.
3. Hossore.........do.
4. Toort Calvah....do.
5. Ramsaugur.......do.
6. Kumply...........do.
7. Seroogooppah....do.
8. Dasanore.... ... .do.
9. Rampoor..........do.

20. From the above 9 works a corresponding number of channels is led off affording water for the irrigation of the lands of 45 villages yielding the aggregate revenue above mentioned. These channels are all effective though in a deteriorated state, which ought not to be the case considering that the sum of Rupees 13,000 is expended annually upon their clearance and repair. The total length of the 9 channels is nearly 100 miles—considering their extent and superabundant supply of water, it seems strange that they should produce so little revenue to Government, but no Officer of the Civil Engineer's Department has yet been able to investigate this subject, nor can it be done unless an Officer should be appointed for the purpose

and relieved from every other duty. At present the expenditure for annual repairs and for clearing the channels is made under the superintendence of the Tahsildar and his subordinates, who may be considered as almost irresponsible for the due application of the money.

21. The above works are the finest in the district and are monuments of the skill, labour, and public spirit of former native rulers. The positions for the anicuts have been chosen with great judgment, and the channels have been formed with consummate skill especially considering that the works were executed upwards of 400 years ago. One channel alone, the Rai Calvah, is 20 miles in length and at its termination supplies the Camalapoor Tank which in former days must have been one of the principal reservoirs of the city of Beejanuggur. Great science and ingenuity are displayed in the selection of the line so that the level of this channel should be preserved above that of the bed of the Tank, and to effect this, the line is carried along the side of a range of low hills at a considerable height above the valley below. The work is in some places excavated in solid rock, and in others it is embanked with stone, plastered with chunam, and backed with earth. The number of villages irrigated by this channel is 12 and its revenue is given at Rupees 28,000. It is spanned by 12 Bridges for keeping up communication between its opposite banks, and 66 branch channels are taken from it for watering the adjacent lands,

22. Besides the above works the ruins of 3 other anicuts are to be found in the bed of the Toombudra, viz. at Moodulkutta, Soogoor, and Munchala respectively. The first of these works was visited by Captain Ditmas, whose report is unfavorable to its restoration.

23. A Plan of the second work was made by Mr. Assistant Surveyor Beahen, and a line of levels taken extending for about 6 miles which shewed the practicability of turning the water upon the land. From a cursory inspection of the ground made by me when on my way to Seroogooppah, I feel convinced that the restoration of the work could be effected at a cost that would secure its being profitable to Government. The work can be traced all the way across the River a distance of 550 yards, and for upwards of half this length it is more than half the requisite height. The quantity of masonry required to complete the work would not be great, the foundation being good throughout.

24. Regarding the third anicut at Munchala I am informed that little work is required to make it efficient, but that from want of a channel there is no cultivation. It is surmised that neither this nor the anicut at Moodulkutta was ever completed, but that disturbances in the country interrupted

their progress and the work was never resumed. It is probable that this occurred on the Mohommedan conquest of the country.

The next river of importance is the

Pennar.

Length within the District 160 *miles.*

25. I have no accurate information regarding the number of anicuts across this River, but I am aware that several such works exist in the Gooty and Raidroog Talooks where the bed of the river is rocky and favorable for their construction. They are all small works, however, the Revenue of each being less than 500 Rupees except in one instance where the ayacut revenue of a channel supplied by the Singanahully anicut amounts to Rupees 572, the average collection being stated at Rupees 435.

26. A large number of channels are taken from this river in the Yadakee, Tandputry, Pengondah, Codecondah and Durmavaram talooks, the water being directed into them by corumboos or temporary dams. I cannot ascertain the total number of these but it appears that 57 of them yield a revenue severally of not less than Rupees 500. One of these channels supplies the Hindoopoor Soogoor tank, but as it is out of order the revenue of the tank falls considerably under the proper standard. The aggregate ayacut upon the 57 channels amounts to Rupees 73,181, whilst the average revenue is only Rupees 39,681 or but little more than half the ayacut. This in itself argues some defect, but great disproportion between the Revenue actually raised and that which the land is considered to be capable of yielding is to be expected when the land is irrigated by corumboos liable to be destroyed by every fresh of the river. The labour and vexation undergone by the ryots in keeping these dams in repair, and the channels clear, prevent them from giving their crops that attention which they require, and consequently the quantity of cultivation must be diminished.

27. Omitting those the Revenue of which is under Rupees 500, 7 Tanks also are supplied by means of channels and Corumboos from the Pennar, their collective ayacut being Rupees 15,750 and their Revenue Rupees 8,873. It will be observed that there is nearly the same disproportion between these figures as in the case above remarked upon. It is highly probable from the results here obtained, that the channels now noticed are out of condition, and that they will always remain more or less in this state till the corumboos are replaced by permanent masonry dams capable of resisting the violence of the freshes of the River.

The next River to be noticed is the

Huggry.

Length within the District 100 *miles.*

28. There are no anicuts across this river. Its bed being sandy has

been considered unfavorable for such construction. Many channels however are led from its banks for which great facility is offered as the banks are low, and the stream flows through a soil of alluvial deposit in which channels can easily be cut. The slope of its bed is gentle, and its current moderate except during the highest freshes.

29. I have no information as to the exact number of channels taken from this river, but it is very considerable. Omitting to notice those whose Revenue is less than 500 Rupees, I find that there are 20 channels supplied by corumboos the aggregate ayacut of which is Rupees 27,381, whilst the net Revenue amounts to Rupees 13,468.

30. There are also two Tanks supplied by channels from this river whose ayacut is Rupees 22,663 whilst the Revenue is only Rupees 8,088.

31. From personal observation I can state that the channels belonging to this river are in a very deteriorated state. In many instances the soft yielding banks having been cut away by the encroachments of the river, the heads of the channels have become completely destroyed. It has become necessary to cut several new heads this year. The two tanks alluded to above as deriving their supply from this river are the Cunakul and the Cottapully tanks in the Raidroog Talook, but the channels this year have been so completely ruined by the previous floods that the ryots object again to repair the corumboo, and urgently demand a permanent dam and new channel. There will be a great falling off in the Revenue of these tanks this season.

32. It will be observed that the net revenue of the works belonging to this river is less than half of the ayacut in all the instances above noticed.

Chinna Huggry or Janaganahully River.

33. Several channels are taken from this river the principal ones being 7 in number with an Ayacut of Rupees 7,287 and a revenue of Rupees 2,089.

Chinna Huggry River in the Hoovinhudgally Talook.

34. There are many small channels led from this river but most of them are small and in bad order. The three principal ones shew an average revenue of Rupees 2,900, the Ayacut being Rupees 5,883-14. This year (1853) new heads are being cut to the channels that supply the villages of Tumburhully and Kudlahall, and an estimate amounting to Rupees 5,830 for a new permanent anicut and channel for the supply of Bachanhully and Anandavunhully was lately forwarded by this Department to the Revenue Board Department of Public Works for sanction.

35. Besides the principal rivers above reported upon, there are 8 streams of less importance but which contribute greatly to the irrigation of the country; their names are:

- 1st Chittravutty.
- 2d Vungaparoo.
- 3d Kooshavutty.
- 4th Tuddakalair and Pundamair.
- 5th Palatyvunka.
- 6th Narrehulla.
- 7th Jayamungally.
- 8th Hundree.

Chittravutty River.

36. The Bookaputnum tank which is the finest and most valuable in the district is formed by the construction of an embankment across this river. The large tank of Dhurmavaram is also supplied by the same stream. The united ayacut of these two reservoirs is given at Rupees 42,758 but the average revenue yielded by them is only Rupees 23,611. It is stated that the supply of these fine tanks never fails and as their highest revenues respectively only 12 years ago were Rupees 22,000 and Rupees 7,098, it is difficult to account for the falling off now exhibited in the Revenue accounts. It could not be caused by the silting of the tank within such a short period. The subject is worthy of further investigation.

37. There are several loose stone anicuts across this river. The channels from the two principal works of this kind yield a Revenue of Rupees 454, their ayacut being Rupees 1,686, these two amounts being in the relative proportion to each other of 1 to 3½ nearly.

38. There are also 28 corumboo channels across the stream the average Revenue of which amounts to Rupees 15,316, whilst the ayacut is Rupees 31,474, these sums being in the relative proportion of 1 to 2 nearly.

Vungapair.

39. This stream is one of the direct feeders of the Dhurmaveram tank, the revenue of which is given above. It also supplies several tanks by anicut channels, three of which give a Revenue of Rupees 5,615 to an ayacut of Rupees 1,627-9-0. Other channels are supplied by corumboos the average Revenue being Rupees 2,109 and the ayacut Rupees 7,262. The Kannamokla and Bussumpully tanks in the Dhurmaveram talook are also supplied by this stream but their revenues are included in those of the above channels.

Kooshavutty in the Codeecondah Talook.

40. There are 4 tanks supplied by corumboos from this stream their Revenue being Rupees 3,296 and their ayacut Rupees 5,122.

Tudakulair and Pundamair.

41. These two streams afford a direct supply first to the Anantapoor tank, the surplus of which flows on to the Singanamullay tank. The ayacut of these two tanks is Rupees 41,094 and their average Revenue is only about half this sum or Rupees 21,005. The highest Revenue of each of these tanks is given at about Rupees 13,000 in the Revenue accounts prepared by the late Mr. Robertson.

42. One of the channels taken from this stream by means of a corumboo supplies the Raptand tank in the Anantapoor talook the ayacut of which is Rupees 1,983 and the Revenue Rupees 694. There are also 3 channels for direct irrigation taken from it by means of corumboos, their aggregate ayacut and Revenue being respectively Rupees 2,361 and Rupees 674.

Palatevunka.

43. A channel and corumboo from this stream afford irrigation to land, the ayacut and revenue of which are respectively Rupees 718 and Rupees 306.

Narechulla.

44. This stream is the principal feeder of the Darojee Tank which is formed by damming up its outlet through a gorge between the hills at the N. W. extremity of the copper mountain range. It contains the drainage of the S. E. portion of the Soondoor, and is swelled to an impetuous torrent by heavy rain amongst the neighbouring Hills. The ayacut of the Darojee Tank is Rupees 10,938 but its average Revenue does not exceed Rupees 7,175. This is accounted for by the quantity of soda that exists in some parts of the land below the tank, which is said to destroy the fertility of the soil.

45. But besides supplying the tank many channels are taken from this stream, the water being turned into them by loose stone anicuts, many of these dams were carried away by the flood of 1851 and have not yet been repaired (in 1853). Most of them are but small and of minor importance, but 8 of the principal channels irrigate land, the ayacut of which amounts to Rupees 8,298 the Revenue being only Rupees 4,536.

Juyamungaley.

46. This is the direct feeder of the Purghee Tank in the Pennacondah Talook, its ayacut being Rupees 16,258 and its average Revenue Rupees 7,525. By means of corumboos two other tanks are supplied by it as well as the Naiterhully irrigation channel in the Pennacondah Talook exclusive of several other works of minor importance the Revenue of each being under Rupees 500.

Hundree.

47. There are several channels taken from this stream, but as none them exceed 500 Rupees in Revenue, I have not been able to obtain a particulars regarding them. The stream contains the drainage of the Y ramulla hills, and is large and rapid when full, and might be taken advant of to a greater extent of irrigation.

Spring Channels.

48. I am not aware of the exact number of these to be found in district, but omitting all of less annual Revenue than Rupees 500, th remain 49 the aggregate ayacut of which amounts to Rupees 49,497, whi the average Revenue realized is only Rupees 22,685 or less than one half ayacut.

Jungle Streams.

49. These streams which collect and carry off the drainage produ by the local rains, as they unite their channels their onward progress aff a supply to a large number of tanks. An exact account of these as dist guished from those supplied by other sources is not immediately procural but it is probable they amount to about 1,000. Of these 396 yield a Reve severally above Rupees 500, their total Revenue being Rupees 2,38,151 a their ayacut 5,64,517.

50. There are also many loose stone anicuts across these streams supplying tanks of which 12 supplied in this manner yield a Revenue Rupees 8,249 their ayacut being Rupees 22,195.

51. The above statement is important as shewing in one view the most useful particulars of the principal works of irrigation in the district. But what renders it a valuable addition to this report is the emphatic proof it affords, that these works are not in a satisfactory state. The collective revenue of the works included in it is Rupees 5,68,320 or about half the revenue derived from the whole of the wet cultivation of the district, this latter being Rupees 11,35,369. If therefore the works which yield one half of the revenue fall under the ayacut by upwards of six lacs of Rupees, it is but fair to conclude that a similar failure takes place with regard to the remaining works from which the other half of the revenue is derived, and thus twelve lacs may be taken to represent the difference between the total ayacut and the total revenue of the irrigated lands in the district—or in other words, Government realize less than half of what the land is considered to be capable of yielding. A considerable portion of this sum, say four lacs may be accounted for by some of the land included in the ayacut being of bad quality and by other contingencies, but it is impossible to account for the other eight lacs, which may be taken to represent the annual loss to Government, except by admitting the fact that the works are ineffective in affording to the country any adequate benefit from its natural resources.

52. Appended to this report is a list* of tanks, the respective revenue of which is above Rupees 1,000. This may be useful for reference. Future reports will contain similar notice of the irrigation channels.

53. In a note to the 29th para of this report, I have stated the revenue derived from the wet cultivation of the district to be Rupees 11,35,369. It may be useful here to record the particulars.

Revenue of Tanks.

	Acres.	Assessment in Rupees.	Total.
Dittum or Tahsildar's Settlement..................	59,338	5,23,747	
Deduct for uncultivated land at the time of Jummabundy............................	12,865	86,454	
		Difference......	4,37,293
Revenue of Channels.			
Dittum or Tahsildar's Settlement....	36,113	3,97,786	
Deduct for uncultivated land at do. do...	3,979	32,497	
Wells.		Difference......	3,65,289
Dittum or Tahsildar's Settlement.................	46,562	3,64,851	
Deduct for uncultivated land at do. do...	4,435	32,064	
		Difference......	3,32,787
		Total Revenue of Wet Cultivation...	11,35,369

---

* Marked A.

54. From the general statistics of the district it appears that

The number of tanks including Dusavundum is		1,401
do. of Channels from Rivers is	264	
do. do. from Streams is	1,746	
Total		2,010
do. of Anicuts across Rivers is	46	
across Streams is	285	
Total		331
do. Wells belonging to Government and assessed is	15,460	
Wells dug by Ryots and assessed	1,776	
Total of Wells assessed		17,236
Add Manium		4,815
Wells dug by Ryots and free		1,644
Total of Wells		23,695

55. In concluding this report upon the present state of the works of irrigation in the district. I cannot but notice the great boon conferred upon the country by the permission lately accorded by Government to the ryot in allowing him to dig wells for the improvement of his land without these being subject to extra tax. About 10 years ago some permission of this kind was given but subject to certain restrictions. These restrictions have been removed entirely within the last three years, and it may be expected that the fruits of this wise and beneficient measure will soon be shewn in the improved cultivation of the country. The number of wells included in the above statement as free (1644) have all been dug within the last 10 years, and it is probable that future yearly reports will exhibit an increase to their numbers in a superior and steadily advancing ratio.

56. The foregoing report has shewn that the district of Bellary is almost bountifully supplied with rivers and tributary streams for the irrigation of its soil. It certainly does not possess the advantages inherent to a district situated at the delta of an important River, or on the sea coast, but it contains within itself all the essential elements of prosperity.

57. If it be acknowledged that the district is impoverished and that it's people are more barbarous in comparison with other districts, the cause of this is not to be sought for in themselves, but in the circumstances under which they have been placed. Shut out from intercourse with other countries, highly taxed, exposed to famine and drought, and flood and pestilence, without adequate public measures being taken for averting these constantly recurring evils, it is not surprising that both the people and the district should deteriorate. This state of things is to be regretted, but the capabilities of the district

are great, and it is only necessary that a liberal portion of its surplus revenue should be applied to the construction of works of irrigation, and the formation of roads, to raise it to an equal degree of prosperity with the more favored districts nearer to the Presidency. The rivers and streams which intersect it might be taken advantage of to a much larger extent than now exists for the supply of works of irrigation, and though considerable portions of the country are covered with cotton soil, gravel suitable for the formation of excellent roads is generally obtainable at a depth of from 1 to 3 yards below the surface. The sterile aspect of the country and the almost total absence of trees on its surface is attributable generally to this fact so favorable to road making. Notwithstanding these great advantages however the district is still wanting in every thing that can make a country prosperous, or raise a people from the most abject poverty to a state of comparative happiness and comfort. Irrigation as compared with the capabilities of the district is defective to a degree. Roads, there are none deserving of the name. There certainly are tracks through some parts of the districts marked out by aloe and milk bush hedges, but from want of bridges and drains these tracks are divided into isolated portions by the rivers that intersect them. At present there is not a single arched bridge available for travellers throughout the district, though it is intersected by rivers and streams in every direction. The district is actually locked up from the surrounding provinces and without means either for the export of its produce or for the introduction of European articles of commerce. It is also avoided as much as possible by European travellers from the want of those conveniences possessed by other districts. Bungalows exist upon three lines only, but others are greatly required. On one of these lines between Bangalore and Bellary although bungalows have been erected the road being almost impracticable for carts is avoided by travellers, who prefer reaching Bellary by the new line to Bangalore all of which lies within the limits of the Mysore territory with the exception of 13 miles within the Bellary district. This answers for reaching Bellary only, but here the traveller to the Northward must stop from want of either roads or bungalows.

58. The line North Eastward to Kurnool is merely a track made by the wheels of country carts. No attempt has ever been made for its formation or to make those portions passable that are either intersected by streams or subject to inundations. The same may be said of the road Northward by Adonee which being the more direct line to Hydrabad will sooner or later be adopted. And this appears to be a most favorable time for commencing it, as it is highly desirable to give employment to the poorer classes who are now suffering greatly from the effects of drought. The failure of the monsoons of the present year having already raised the price of food to double its usual

cost, great distress prevails amongst the people and crime is in consequence greatly on the increase. The same effects have been felt from a like cause in the Hyderabad country, and as the portion of territory through which this line will pass has lately come under European management, the authorities there are fully alive to the necessity for giving the suffering people the means of procuring an honest livelihood. I believe they are ready to commence the work at once, and I would recommend the same course being adopted by our Government without waiting for the usual requirements of Surveys, Plans and Estimates which the other heavy duties of this Department utterly prevent my preparing in time. The employment of the people is emergent, and the utility of such a road unquestionable. From this being the direct road to Hyderabad it might be desirable in a political point of view to construct a bridge on it across the Toombudra. Such a work would also afford the advantage of connecting our own territories with the lately ceded country on the other side of the river. The expense of the work would probably be shared by the Hydrabad state.

59. There are no bungalows between the two military stations of Bellary and Kurnool. This road was surveyed last year by this department, but from the pressure of other duties I have not yet been able to prepare the plans and estimates. Estimates for 5 bungalows are under preparation ; the stations for them being Mokay, Alloor, Auspree, Davunkonda and Codoomoor.

60. From Alloor I propose that a branch from the direct road to Kurnool be carried to Adonee and so onwards to the Toombudra and the Hyderabad country.

61. Another very important line is that between Bellary and Anantapoor, the Head Quarters respectively of the Collector and Sub-Collector of the district. This line ought to be made and kept in an efficient state, and might be extended till it meets the proposed line of railway between Cuddapah and Madras. Its formation would afford an outlet for the cotton and other produce of the Bellary and Cuddapah districts to reach the railway. At present it is intersected by the Pennair, a broad and rapid river impassable when full even for the tappal, the district being then divided into two isolated portions and all communications cut off between the Collector and Sub-Collector.

62. The road towards Dharwar now being constructed under the sanction of Government will be a great boon to the district—but to make it more extensively useful it is necessary that it should be extended from Humpsaugur via Hoovinhudgallee, Herahudgallee crossing the Toombudra near Mundygaury, and carried onwards through the Southern Maharatta country via Hawary, Alloor and Sirey to the shipping port of Coompta in the western coast. This

is the track now in use, but the difficulties are so great that cotton from the most western Talooks of Bellary is not conveyed to Coompta under 25 per cent upon its original cost. The portion of this line in the Dharwar country being under the Bombay Government should be made by the authorities of that Presidency, that in the Canara District is now in vigorous progress under Lieutenant Babington.

63. The same line also should be extended as generally contemplated from Humpsaugur via Damul and Guduk towards Dharwar, which will require to be done by the Bombay authorities.

64. An estimate was framed by my predecessor Captain Ditmas, for a road between Humpsaugur and Oojinny on the Mysore frontier, being part of a line extending from Chittledroog, through Bellary, and the Nizam's Territories, to Bodamee and Caladeghee in the Southern Mahratta country. The distance is 89½ miles and the amount of the estimate is Rupees 17,183–3 including a sum of Rupees 6,677–8 for gravelling, but the road is said to be required merely for fair weather traffic, the gravelling and drain work are considered by the Bombay Government to be unnecessary, and the estimate has accordingly been returned to this office for revision, but this I have not yet been able to effect, the time of my department having been completely occupied by other duties.

65. Although the new road from Bangalore to Bellary via Toomkoor and Herahall is the best and most convenient line of communication between these two stations, this should not be allowed to supercede the necessity for keeping up the old line by Bagapilly and Pairoor. This latter is a most useful road of internal as well as of external communication, and should be kept in good order to enable the grain and other produce of the southern parts of the district and of the Northern parts of Mysore to be brought to the Bellary market. The portion of this road in Bellary is in a wretched state, although it has been completed with drains to the limits of the two districts by the Mysore authorities.

66. The above remarks and suggestions apply to the main communications of the district with a view to facilitating its general commerce with other countries; but if their state be such as to compel the use of bullocks generally for the transport of the traffic, it cannot be expected that the tributary or talook road should be in better order—both are carried over the natural soil, through swamps, across nullahs, and over rocky and stony ground, with only here and there a slight attempt at the amelioration of these difficulties. Better means of internal communication between towns and villages are urgently required, and a much larger sum than has hitherto been allowed should be placed at the disposal of the Public Works Department

for effecting this most desirable object. The present allowance for keeping up the talook roads is only 650 Rupees per annum, and as the district is nearly 13,000 square miles in extent, this allowance is at the rate of one anna and three pice or less than two pence for a square mile. This sum so utterly inadequate to the object for which it is granted ought to be at once increased tenfold. Were an annual grant of Rupees 6,500 to be made for this purpose the district would soon feel the benefit of the expenditure. It is not necessary that these roads should be made throughout, but they should be drained, and all obstacles removed to the passage of country carts.

67. It may here be noticed that the increased outlay above proposed falls within the sum realized annually by Government by farming the ferries of the different rivers within the district. The net proceeds to Government under this head amount to Rupees 7,000 which has hitherto been carried to account in the general revenue returns, but as these funds are realized by a tax upon traffic and upon travellers, it seems but fair that they should be expended upon the improvement of the roads and ferries, and I believe orders have been issued by the Court of Directors that they should be so appropriated, instead of being swept into the General Treasury as is still practised in the Bellary district.

68. And with regard to these ferries which are 53 in number, I have to remark that the only means now employed in the Bellary district for crossing the rivers is by the primitive round basket boat made of bamboo frame work and covered with leather hides stitched together. These are made up and kept in repair by the contractors who farm the ferries from Government, and who are therefore interested in expending as little money upon them as possible. When the rivers are rapid these frail rafts are very unmanageable, and when slightly made or overloaded, they occasionally collapse in the midst of the stream and great loss of life is the frequent consequence. This however is in a fair way of being remedied, Government having lately sanctioned Rupees 500 for constructing a substantial teakwood ferry-boat with a view to their ultimately being adopted at all the ferries.

69. With regard to irrigation, except such repair and restoration of tanks as have been considered necessary to secure the ordinary revenue little or nothing has yet been done. No attempt has been made to improve the country by increasing the number of irrigation works, and many of these that were constructed and used by former Native Governments are now to be found either in a state of decay or of utter ruin. When the district first came under the British rule, the tanks were generally in a very deteriorated state, but as the revenue depended upon their efficiency, their restoration was gradually undertaken—those which paid best, receiving the first attention.

70. The late Mr. Robertson, formerly Collector of the district, was keenly alive to the importance of irrigation works, and under him many tanks were repaired, but from many of these works coming under the restrictions of Government they were left untouched, and hence the number of ruined tanks still to be found throughout the district. These restrictions which limit the sanction of Government to such tanks only as are likely to repay the expense of their restoration in five years must operate greatly against the prosperity of the country generally, and are peculiarly discouraging to the advancement of a district like Bellary so greatly liable to alternate drought and inundation. The policy of the ancient Native Governments judging from the variety and solidity of their irrigation works, appears to have been more liberal and more conducive to the improvement of the country and the happiness and well-being of the people. I would strongly recommend that every tank and goontah throughout the district should be repaired. It is only by storing up the superabundant water of one season, that the drought of another can be counteracted and every means should be employed that will effect this purpose. The small goontahs are greatly required for the use of cattle in the dry season, and in proportion to the increased number of reservoirs, will be the number of water springs, and the consequent facility of digging wells with success. The expense of digging wells arising from the depth of the springs is almost an insurmountable obstacle to this species of irrigation. The ryots are generally too impoverished for such undertakings at present, although they know that without extra taxation the produce of their land would be doubled or perhaps trebled by well irrigation.

71. Nor is the Government without an interest in this question: for though they might fail in obtaining 20 per cent for their outlay from the cultivation of the lands immediately under many of the restored reservoirs, they would be sure to gain through the improved condition of the people. Scarcity and the consequent high price of food would be in a measure counteracted, the land would be made to yield a greater variety and a greater quantity of produce, and thus the ryots would be enabled to extend their cultivation to the advantage of the Government landlord.

72. It ought also to be kept in view that the general food of the poorest classes in the Bellary district is not rice, but dry grain such as cholum, raggy, &c., the production of which would be greatly augmented by the measures now advocated.

73. And here it may not be out of place to repeat that no new works are here recommended, but merely the repair of old ones, and the restoration to the district of those means of irrigation which it once enjoyed. The number of ruined tanks in the district does not appear to be entered

in the Collector's return, but on a rough calculation they may probably amount to 400. They are to be found scattered all over the district—several of them that I have seen are magnificent works, and great judgment has generally been shewn in the selection of their sites. Others are but small works though very favorably situated. The whole might be put into repair by the gradual expenditure of about 15 lacs of Rupees, a sum that would hardly suffice for the original construction of the five principal tanks of the district.

74. There is an inherent defect in the construction of all the old tanks which probably accounts for so many being now in ruins, and certainly was the cause of much of the havoc made amongst them by the flood of 1851. I allude to the want of sufficient outlet for the rapid discharge of surplus water. The natives are naturally avaricious of water, and are apt to imagine that the narrower the outlet of a tank the greater will be the supply. They do not act as if they were fully aware that the supply retained depends upon the level of the Calingulah, and that provided this level be preserved the supply will not be diminished by the extension of the work. In the repairs lately carried on throughout the district this principle was kept in view, and should not be lost sight of in the further restoration of the ancient ruined tanks.

75. Many of the tanks that were breached in the storms of 1851 and 1852 are still in an inefficient state, but every exertion is being used by the Collector's Department to bring these into order.

76. The river channels throughout the district are generally in a very deteriorated state, and efficient measures are urgently required to prevent their sinking further into decay. The best method of preserving these works is by the construction of permanent anicuts across the rivers. One work of this kind would not only afford an excellent and permanent supply of water to lands which now require several corumboos and channels for their irrigation, but would moreover bring land under cultivation, now lying waste, from its being inaccessible to the present means of irrigation. The ryots also being relieved from the constant repair of their corumboos would gladly give their labour to the new land.

77. In the 65th Para of this report I stated that an estimate amounting to Rupees 5,883–14–0 was now awaiting sanction for a permanent anicut across the Chinna Huggry to water the lands of Buchunhully and Anundevunhully in the Hoovinhudgully talook. These villages were formerly watered by two separate channels both of which are now in disuse. The revenue has suffered in consequence and the villages have been dwindling from their former prosperity to a state of comparative ruin.

78. I have lately been engaged in surveying and taking levels near Canakul in the Raidroog talook, with a view to restoring the supply of this tank by the construction of a permanent anicut across the Huggry River near the village of Yaipral. The result of these investigations is the proof that the supply can be extended to the Streedaragutta tank and that a large portion of the intermediate and adjacent land might be irrigated by the same work. The cost of the project will be considerable but it is urgently called for and will secure great benefit to the district. At present the average revenue of the Canakul tank is only about one third of its ayacut and this year the disproportion will be still greater. Plans and Estimates for the project are under preparation.

79. The Nagalapoor tank in the Raidroog talook was formerly supplied by a river channel from the Huggry, but this work is now almost obliterated and the revenue of the tank has greatly fallen off in consequence. A new channel is greatly required.

80. The Yaiparal tank was formerly supplied from the Huggry, but the channel is now inefficient and requires a new head besides other works for its protection.

81. The banks of the Huggry being generally of alluvial soil are greatly liable to erosion from the irregularity and strength of its current. Several works are required for counteracting this and for securing to the district the utmost advantages which this most favorably situated river is so well calculated to afford. In fact for the whole of its course in the Bellary district (100 miles) it ought to be considered as the main irrigation channel of the vast plains through which it flows. The construction of 4 or 5 anicuts across its bed with the necessary auxiliary works would change the character of the district, and diffuse happiness and plenty where there is now but misery and starvation. And this could be accomplished by the judicious expenditure of 5 lacs of Rupees.

82. Another work that ought to be undertaken by Government and which has been recommended by all my predecessors, is the construction of an anicut across the Pennar in the Codycondah talook near Hindoopoor for the supply of Soogoor, Soodapagoontah, Cotnoor and other tanks. There is no doubt of the profit to be derived from this project both to Government and the people. The Cotnoor tank is of great extent and the village was once prosperous, but on account of the precarious supply received by means of a corumboo, the cultivation has greatly diminished, and the village is rapidly sinking into insignificance.

83. An examination of the loose stone anicuts and channels of the Pennar is very much required, and it is proposed to construct a permanent dam

near Ruddum for the supply of a chain of tanks extending to Anantapoor and Singanamully, but this project has not yet been examined.

84. An anicut is also proposed across the Hundry near Gazeldoddy for the supply of the Kena Bellagul tank in the Punchapollium talook.

85. The cause of the contrast between the revenue and ayacut of many of the tanks included in the Appendix marked A which accompanies this report appears to be a fit subject for investigation, and I would specify the following cases of large tanks that derive a supply from rivers either directly or through channels and that have seldom been known to fail.

Anantapoor,
Bookapatnum,
Purghy,
Dhurmavaram,

the last of these is considered to be very well supplied and yet its revenue is but little above one half of its standard.

86. An examination of the Toombudra anicuts is also greatly required with a view to the extension of the irrigation under these works. The appointment of an officer to the charge of these works to superintend their annual repairs, to suggest and carry out improvements, and to make the investigation above recommended is highly necessary.

87. I would also beg to recommend the general restoration of the hundreds of ancient tanks and goontahs constructed by former Native Governments that are now to be found scattered all over the district, but in a ruined state. These ruins confirm the impression that the country is not what it was at some former period, and the aspect of the people and the ruined state of the villages, plead for the benevolent assistance of Government to raise them from their present condition.

88. It may now be considered that the physical wants of the district as well as the means for their accomplishment have been pointed out in the above report, but one important medium through which these beneficial changes must be effected remains still to be noticed. I allude to the paucity of officers in the Public Works Department. When it is considered that I am the only Engineer Officer in the Bellary district, and that the districts of Canara and Kurnool are also placed under my charge comprising a collective area of 27,000 square miles of territory, it can hardly be expected that much progress should be made in the execution of new or important public works. Under such circumstances it is difficult to make head against the annual wear and tear of the works already in operation. The two local road assistants in

Canara, and one in Bellary, are very useful as executive officers in their respective charges; but the Bellary district alone requires additional officers for its general duties. These duties which comprise the projecting and planning of new works, as well as the general supervision, estimating and examination of the accounts of old ones, have to be carried on when the department is in constant movement, and my subordinates being continually attacked with sickness from want of choultries in the villages, or ordinary shelter for them to sleep under at night; and this consideration viz. the want of any shelter for natives and other poorer classes of East India travellers leads me to include "native choultries" in the list of the wants of the district.

89. I shall now conclude this report by a summary of the wants of the Bellary district under two heads, the 1st being founded upon personal observation, and the 2d such as are merely suggestive from information received.

1st. *Special wants of the District ascertained by personal Observation.*

Roads.

1st. Prolongation of the western road from Humpasagur to Dharwar.

2d. Branch from do. to the port of Coompta on the Western Coast.

3d. Branch road from do. to Oojinny on the Mysore frontier.

4th. Construction of a road from Bellary to Kurnool.

5th. Branch road from do. to Adonee and the Toombudra river.

6th. Repair of the road from Bellary towards Bangalore by Peiroor and Bagapully.

7th. Construction of bridge across the Pennar on the line between Bellary and Anantapoor.

8th. Construction of 1st class road between Bellary via Anantapoor towards the proposed Railroad to Cuddapah.

9th. Improvement of the road between Bellary and Gooty.

10th. Native choultries for the accommodation of travellers.

11th. Public Bungalows for European travellers.

90. In the above list I omit the roads from Koodootanee to Darojee, two estimates for which are now before the Board.

Irrigation Works.

1st. Examination of the Toombudra Channels with a view to the extension of the irrigation under them.

2d. Anicut across the Huggry for the supply of the Canakul tank.

3d. New river channel from the Huggry for the supply of the Yaparal tank.

4th. Improvement of the Huggry river channels generally by permanent dams and the construction of other works to protect the cultivation on its banks from the encroachments and inundations of the river.

5th. New channel from Chinna Huggry to supply the Nagalapoor tank.

6th. Anicut across the Pennar for the supply of Hindoopoor Soogoor tank.

7th. Improvement of the river channels generally throughout the district.

8th. Restoration of the ancient tanks and goontahs throughout the district.

9th. Investigation as to the cause of the great disproportion between the standard and actual revenue of the principal tanks and irrigation works in general.

2dly. Wants of the district suggested by information but not yet examined.

1st. An anicut across the Pennar at Ruddum for supplying a chain of tanks onwards to Anantapoor.

2d. Anicut across the Hundree for the supply of the Kerra Bellagul tank.

3d. Completion of the 3 anicuts across the Toombudra at Moodulkutta, Soogoor and Munchala.

91. I ought perhaps to apologize for the great length of this document, but I have been led to point out fully the present condition and the wants of the Bellary district from the detailed information required by the Revenue Board Department Public Works in their order calling for this report—much of the information and many of the suggestions contained in this paper were brought to the notice of the Board by Major Lawford so far back as 1840; but as they have not yet been acted upon, they still remain applicable to the present state of the district.

92. I may add that the works suggested in this report are approved by Mr. Pelly the Collector of the district, who is always ready to support any plan for the improvement of the district by the judicious application of its vast natural resources.

Civil Engineer's Office,
3d Division Bellary District,
Bellary Talook,
Heeryhall, 21st November, 1853.

ROBERT HENDERSON,
Civil Engineer 3d Division and
of Kurnool Territory.

APPENDIX A.

BELLARY DISTRICT.

List of all the Tanks the Average Collection of Revenue derived from which is above 1,000 Rupees.

Talook.	Names of Villages.	Name of Tank.	Total extent of land fit for Nunja or wet cultivation.		Average Collection.		Means of Supply.
			Land.	Rupees.	Land.	Rupees.	
Kumply.	1. Darojee	Pedda Chervoo	1,180	10,938	963	7,175	Naree river.
	2. Camalapoor	Cusbah Tank	178	4,941	163	3,395	Rai Calwah.
			1,358	15,879	1,126	10,570	
Hurponhully.	1. Bagalee	Tank	234	2,042	189	1,231	All jungle streams.
	2. Hagaranoor	Do.	288	3,608	211	2,240	
	3. Neelgoonda	Bheemasevara Tank	324	2,415	277	1,525	
	4. Narnapoor	Aseenakara do.	148	1,881	132	1,167	
	5. Koonchoor	Large do.	271	2,135	200	1,126	
	6. Arsekara	Small do.	231	3,048	126	1,499	
			1,496	15,129	1,135	8,788	
Koodlighee.	1. Chowdapoor	Large Tank	141	1,861	106	1,082	Jungle stream.
	2. Kottoor	Tank	495	6,843	223	2,345	Anicut across do.
	3. Hunsee	Large Tank	415	6,729	191	2,211	Jungle streams.
	4. Domaikenkara	Kumaramana Tank	955	11,317	567	5,314	
	5. Narrain Davurkara	Tank	208	2,841	145	1,403	
			2,214	29,591	1,232	12,355	

List of all the Tanks, &c.—(continued.)

Talook.	Names of Villages.	Name of Tank.	Total extent of land fit for Nunja or wet cultivation.		Average Collection.		Means of Supply.
			Land.	Rupees.	Land.	Rupees.	
Hoovinhudgully.	1. Herahudgaly	Tank	106	2,205	70	1,097	Jungle streams.
	2. Magemavenahully	Large Tank	267	2,703	164	1,374	
	3. Hora Heggadahall	Tank	277	2,628	167	1,248	
	4. Chintalapully	Do.	311	3,069	144	1,181	
			961	10,605	545	4,900	
Adony.	1. Chinna Toombalum	Karimsaib Tank	1,116	11,428	542	4,422	Jungle stream.
Puncha-pollium	1. Karabalagul	Tank	324	3,022	167	1,391	Do. do.
Gooty.	1. Cusbah Gooty	Large Tank	1,123	8,021	532	3,803	Jungle streams.
	2. Yerratimmarayen Cherroo	Do.	709	5,408	254	2,888	
	3. Potacotta Cherroo	Do.	274	2,841	173	1,418	
			2,106	16,270	959	8,109	
Raidroog.	1. Tallakara	Large Tank	562	4,296	241	1,747	Jungle streams.
	2. Yaradakara	Do.	751	3,940	289	1,680	
	3. Cunnakul	Chiccavodeyára	2,735	20,134	922	7,592	Huggry river.
			4,048	28,370	1,452	11,019	

Anantapoor.	1. Cusbah Anantapoor	Tank	2,782	20,627	1,255	8,927	Pundamair.
	2. Bharamana Yalooroo	Do.	477	3,547	231	1,680	Jungle stream.
	3. Muddeegoobba	Do.	289	2,062	132	1,050	
	4. Singanamullah	Stree Rungaroyel	2,204	20,467	1,376	12,078	Surplus of Anantapoor and Tadakaluir.
			5,752	46,703	2,994	23,735	
Pengondah.	1. Purgee	Cusbah Tank	2,675	16,258	1,414	7,525	Jayamungaley river.
	2. Ootacoor	Tank	1,120	7,615	459	2,543	Jungle stream.
	3. Roddum	Large Tank	927	4,215	235	1,050	
	4. Roddum	Small do.	506	3,060	209	1,415	
	5. Kulpee	Tank	460	3,142	230	1,336	Pennar.
	6. Bookaputnum	Do.	2,607	31,628	1,917	17,821	Chittravutty.
	7. Agraharam	Do.	208	2,535	119	1,199	Jungle stream.
	8. Cusbah Pengondah	Mooteyala Tank	339	2,141	198	1,044	
			8,842	70,594	4,781	33,933	
Yadakee.	1. Bhogasamoodrum	Mullapee Tank	305	4,699	237	2,237	Jungle streams.
	2. Royel Cherroo	Kristnaroyelcherroo	497	5,851	352	2,637	
			802	10,550	589	4,874	
Kodecondah.	1. Colloor	Large Tank	137	1,954	117	1,219	Coosavutty river.
	2. Boodeley	Do.	337	3,538	136	1,059	Jungle stream.
	3. Chelamuttoor	Tank	235	2,494	196	1,724	Coosavutty river.
	4. Kuncheesamoodrum	Large Tank	410	3,071	210	1,671	Jungle stream.
	5. Serevarum	Tank	723	7,665	373	3,380	
	6. Cholasamoodrum	Do.	695	3,223	285	1,321	
	7. Lapatchee	Large Tank	386	2,806	179	1,161	
	8. Kulloor	Tank	397	2,316	204	1,076	
	9. Chowloor	Do.	442	1,960	164	1,155	Pennar.

List of all the Tanks, &c.—(continued.)

Talook.	Names of Villages.	Name of Tank.	Total extent of land fit for Nunja or wet cultivation.		Average Collection.		Means of Supply.
			Land.	Rupees.	Land.	Rupees.	
Kodecondah.	10. Kirkara...	Tank	269	1,992	157	1,003	Pennar.
	11. Basavanahully	Do.	216	2,222	140	1,030	
	12. Santabedoonoor	Do.	343	1,729	287	1,263	
	13. Hindoopoor	Soogoor Tank	913	4,667	567	2,587	
	14. Kotnoor	Large do.	1,451	12,624	630	4,509	Jungle stream & partly from Pennar.
	15. Kodeganahully	Tank	203	1,794	147	1,114	Jungle stream.
			7,157	54,055	3,792	25,272	
Madakaseera.	1. Cusbah Madakaseera	Large Tank	447	3,946	321	2,115	Jungle streams.
	2. Harasamoodrum	Do.	922	6,988	455	2,952	
	3. Amrapooram	Do.	976	10,608	445	4,145	
	4. Veroopasamoodrum	Do.	326	2,123	212	1,248	
	5. Tamadahully	Do.	221	2,255	138	1,003	
	6. Kenkara	Ponnanacutta Tank	218	1,044	135	1,069	
	7. Morebagul	Cusbah Tank	1,288	9,628	527	3,115	
	8. Agaley	Do.	804	9,001	503	4,617	
	9. Serevarum	Do.	751	5,556	345	2,695	
			5,953	51,149	3.081	22,959	

Dhurmaverum.	1. Cusbah Dhurmaverum...	Cusbah Tank	888	11,130	522	5,790	Surplus of Bookaputna and other sources.
	2. Nagasamoodrum	Chiccavodeyar Tank ...	341	4,226	173	1,846	Jungle stream.
	3. Koontemuddee	Tank	1,381	6,814	172	1,082	
	4. Ruvulchervoo	Do.	244	2,438	202	1,435	
	5. Kanamookala	Yerra Tank	277	3,579	110	1,187	Vungapair.
	6. Apparaz Cherroo.........	Tank	248	3,666	169	1,890	Jungle stream.
	7. Maleyanoor	Do.	504	4,503	323	2,430	
	8. Kumbadoor	Do.	771	7,680	369	3,077	
	9. Moolakalaid	Large Tank	709	8,114	402	3,727	
			5,363	32,150	2,442	22,464	
		Grand Total......	47,492	4,15,495	24,837	1,94,791	

ROBERT HENDERSON,

Civil Engineer 3d Division,

and of Kurnool Territory.

Civil Engineer's Office, 3d Division Bellary District,

Bellary Talook, Heeryhall,

21*st November*, 1853.

NOTES BY MR. F. N. MALTBY, COLLECTOR OF CANARA, ON IMPORTANT WORKS EXECUTED IN THE CANARA DISTRICT IN 1852.

No. 1. Arbyle road.

This work was completed in the year under review. That is to say, the sum sanctioned was expended and fulfilled the object proposed, that of opening a trace from Yellapoor, the Cusbah of the Soopah Talook, to Meerjan, and so to Coompta. The road descends the ghauts by the Arbyle pass at an easy gradient. Perhaps so small a sum of money never effected so useful and extensive a work as in this instance under Lieutenant Walker's care. A road practicable to wheeled carriage was opened for 50 miles at an average cost of Rupees 112 per mile, through a rough and wooded country including a long mountain pass.

To derive full advantage from this work the following subsidiary works were required.

To connect Yellapoor with Kirawatti on the Dharwar frontier to which place carts are able to ply over the more open table land of the Southern Mahratta country.

To connect Yellapoor with Hallial and through Hallial with Dharwar.

At the coast end of the road, to connect the foot of the ghaut with Ankola and its port.

To connect the line with the port of Tudderi.

To connect this line of road and the Daivamunnay ghaut.

To facilitate the passage of the Tudderi river on the road to Coompta, by the construction of a wharf at the ferry.

It is sufficient to say that all these works have been submitted to Government and received their sanction, and have either been executed or are in the course of construction and will each be noticed hereafter.

The result has been most satisfactory. The returns of traffic are very little to be relied upon as statistics of the trade. But these facts are apparent. The road is used by numbers of carts especially by the return carts which descend by the Daivamunnay Ghât. Cultivation is extending rapidly in the Soopah talook. The town of Yellapoor is improving greatly, and the whole line and its tributaries are the scene of a busy commerce. The state of the salt trade and the export trade especially in rice and cotton form the best tests of the value of these roads and will be given below.*

What is now required is to convert the line from Meerjan to Hullial into a first class road and to bridge it throughout.

---

* See separate table of Exports and letter to the Commissioners.

The Government have sanctioned an outlay of 75 Rupees per mile for widening the road and Estimates have been submitted for bridging the streams between Meerjan and Yellapoor with timber bridges, and these will I trust receive early sanction.

Yellapoor and Hullial. This road has been completed. See Arbyle line.

No. 2, Daivamunnay ghaut. See Lieutenant Walker's note.

The results of this great work are to be seen in the statistics of the trade of the Port of Coompta given in the table which accompanies this report—the opening of this line has raised Coompta to one of the largest trading ports of the coast, and for the first time introduced the use of wheeled carriage into North Canara.

The rent of the ferry at Dewaga affords an excellent criterion of the increase of the traffic by this line—it has been as follows:*

But there is a work still to be executed before this ghaut can be considered complete. The river Tudderi over which the ferry passes, offers a very serious obstruction to the trade, and is the source of heavy expenses and serious delay. It has been reckoned that the passage of this river cost the trade as much as 13,000 Rupees in the year 1852—a floating bridge seems to be the best means of overcoming the difficulty—(see my letters on this subject.)

This line of road and the Arbyle line, above alluded to, should be considered as one work—they act and re-act upon one another. Lieut. Walker's useful suggestion of connecting the two by a junction road from Katigal to Meerjan has made both a portion of a system of communication which brings all the trade of the Balaghaut either to Coompta or Tudderi as the traders may prefer. The Daivamunnay line was over crowded; but the carts can now return by Arbyle and obtain cheaper fodder. The whole backwater of the Tudderi is available to the commerce of the country and in due time the commercial capital will be on its banks, but this will be effected gradually and without any serious injury to those who have invested their capital at Coompta.

Meerjan junction road. See Lieut. Walker's note. Two bridges on this line commenced in 1851 and finished in the next season are certainly the best laterite masonry ever executed in the district. This is a very useful work as observed above and fully answers its purpose.

		Rs.
* Fusly	1259 —	467.
„	1260 —	1,190.
„	1261 —	1,460.
„	1262 —	1,815.
„	1263 —	2,185.

Eckamby and Samasgee road.

This work was commenced as soon as the sanction was received and carried on with activity. It is a feeder to the Daivamunnay line and its results must be sought in common with that of the main line in the improved trade of the Port of Coompta.

Mangalore and Agomby road—Perdoor and Mulpy road.

These two roads are in fact continuations of the Agomby ghaut line, according to the plan laid down when that useful work was first proposed. They were both carried on with activity and no sooner opened than they came into use. The trade down the ghaut is yearly increasing, and frequently averages a thousand bullocks a day for many days consecutively.

But it is to be observed that of the three roads leading from the foot of this ghaut to Halandy, Mulpy and Mangalore, not one is bridged although it is fifteen years since the Ghât was opened. For this reason carts very seldom ply on this road. The streams which intersect the road, are broad and very rocky, and until they are bridged, the trade must be dependent on bullock carriage only. Above the Ghâts the line has been bridged, so that it is most desirable that the lines below should be bridged as soon as possible. Feeders above the Ghâts are also being opened out, and the increase in the trade of Cundapoor and in the salt trade are a criterion of the usefulness of these works. Masonry piers with wooden platforms could be constructed very cheaply on this line of road as stone and good timber abound.

Munjerabad Ghât.

The progress of this road was very unsatisfactory owing to the late period at which the work commenced, and Captain Boddam's illness. Some bridge work still remains to be executed out of the old estimate, and the road has to be continued to Pani Mangalore and Buntwal. It is most desirable that an officer should be appointed to this line, and that the work should be pressed on to completion. This comprizes the preparation and sanction of an estimate for bridging the Comardari river.

Sumpajee line. Junction between Pootoor and Oopinangady. Feringpett bridge. Soolia and Cassergode junction.

The progress of these works is shewn in the table—their result in the sales of salt and increase in the trade of Mangalore.

Mangalore Marine yard road.

This has converted a swampy suburb of the town ino a clean and busy village. On each side of the road the salt water swamps are being filled with sand and soil and planted, and many new houses and shops have sprung up.

GENERAL REMARKS.

Previously to the year 1836 very little was done towards the improvement of the district. An attempt had been made to improve the old Bisly Ghaut, but the work was carried on with so little Engineering skill that the line has since been abandoned.

The first step made in the right direction was the improvement of the Neelcoond Ghaut and roads; and the effect of the aid afforded to the cotton trade by the mere clearance of obstructions was most striking. The insurrection of 1837 brought forcibly before the Government the state of this district as to its communications. The force assembled to quell the insurrection was literally unable to move from Buntwal up to which point there was water carriage, because there were no roads and no carriage available. A military road through Coorg was ordered, and its continuation to Buntwal was suggested, its necessity was obvious, and it was immediately opened out. Thus the line which had been suggested previously by Mr. Charles Cotton as a commercial road was constructed under the skilful and energetic direction of two young officers of Engineers, Lieutenants Fast and Collyer. This was the commencement of road making in Canara on correct principles.

The Agomby ghaut was next opened out, being recommended for military and commercial purposes. The Munjerabad ghaut was next planned by Captain Green and commenced, but the lapse of 12 years finds it still incomplete. The original plan was that it should terminate at Oopinangady—but experience has now shewn that it must be carried on to Pani Mangalore.

The emergent demands of the cotton trade of North Canara were not half met by the repair of the Neelcoond ghaut: and a cart road by the Daivamunnay ghaut was planned, traced, and after a long interval sanctioned. This work is at last complete but so great has been the traffic that the old portion of the line is fairly worn out.

The Coloor ghaut was the next work undertaken and rapidly completed as an unbridged bullock road.

The Arbyle ghaut was carried on at the same time.

Thus these 1st class roads with bridges, Sumpajee, Munjerabad and Daivamunnay; and these unbridged roads Agomby, Coloor and Arbyle have been under construction since the first start was given in 1836, and many branch roads have connected these with each other or extended the range of their usefulness.

They have been kept in fair repair but a more organized system of management is much required; the repairs are at present made on emergency.

The effect of these works on the country were shewn in a report to the Commissioners of Public Works, copy of which is herewith sent for perusal.

Thus much has been accomplished, but what has been done seems to show only more clearly how much still remains to be done, and how amply the outlay will be reimbursed. The position of the district is very peculiar. The settled Government established in Mysore is stimulating the industry of a people cultivating a fertile country separated from Canara and the coast by the range of ghauts. The settlement of the land revenue in Dharwar has there produced the same results, so that there is a vast amount of produce ready to descend wherever a pass is opened—through the barrier of more than 200 miles in length.

Three different descriptions of works are thus called for.

First, the opening out of good bullock roads through the ghauts traced by scientific Officers, so as to be convertible hereafter into cart roads. These should be executed as speedily and cheaply as possible. Such are the Arbyle and Coloor ghauts.

Secondly. The converting these into cart roads. Experience has shewn that in the present state of the district good platform bridges resting on laterite piers with granite cutwaters are more suitable than the more expensive masonry bridges.

Thirdly. The connecting these together and opening out the low country by cross roads.

Under the 1st head the roads most emergently required are :

The Singawaree Ghat leading direct from Dharwar to Sedashighur (now sanctioned.)

The Neelcond Ghat (on Lieut. Collyer's trace) since sanctioned.

The Guersappa Ghat now traced and partially opened by Lieutenant Walker.

The Kadadakul Ghat which leads from the Coffee country to Mangalore.

Under the second head must be reckoned ; the completion of the Munjerabad line.

The bridging of the Arbyle line submitted for sanction.

When these are completed, the other lines should be taken in succession beginning with the Agomby roads.

Under the third head must be ranged a vast number of roads—which I have classed as talook roads. The Government grant of 6,000 Rupees has enabled the local officers each in his division to superintend several of these, and each year will see them extended.

These are the works required and they will advance in proportion to the sum granted by the Government and the number of Officers whom the Government may see fit to make available for their superintendence.

Each of these roads is of course connected with one or more of the Ports named in the subjoined list.* The ports of the district have as yet received very little attention. Anchorage fees are collected at each but instead of being considered as a fund applicable to local purposes, they have been absorbed in the general treasury. But there is scarcely a port which does not require a quay, or a jetty or a crane, or at which valuable property is not constantly destroyed by the shifting of the river.

The Government have recently sanctioned a new quay at Mangalore and a light house at Coompta, and some useful works for the improvement of the Coompta harbour are under their consideration. But much more is required especially at Mangalore, Cundapoor and Sedashigur—at Mangalore a wooden jetty to allow of shipments at all tides, and a crane for heavy goods are greatly needed—at Cundapoor and Sedashigur as well as at Mangalore the rivers are changing their position and their entrances are less deep than they used to be. The skill of an Engineer Officer would probably modify or remedy this.

Mangalore,
31*st August*, 1853.

F. N. MALTBY,
Collector.
GEO. WARREN WALKER, LIEUT.
Civil Engineer, 3d Division.

REPORT OF IMPORTANT WORKS IN THE CANARA DISTRICT IN PROGRESS DURING THE YEAR 1852.

These are all comprised under the head of roads and bridges, works of the description built for accommodation of the revenue and judicial offices of the district not presenting any features of importance.

Commencing from the South with *Sumpajee ghaut* and *road* from *Mercara to Mangalore*, the improvements to the roadway of the ghaut effected by Overseer Graham during the previous year were completed, and commencement made of cutting a series of check-drains on the hill side to secure the improved roadway from rush of water from above. The large arch of *Feringypett bridge* built of brick on abutments of laterite was finished so shortly before the monsoon that the arch had not time to dry and settle before the roadway was filled in and not being properly backed with a watertight covering over the extrados, the heavy rains early in June appear to have washed the chunam from between the joints of the brickwork and soaked into the bricks themselves, so that in a few days the whole fell in between the haunches. Brickmaking is an art not known in Canara, and the substitution of brick for laterite in this instance was a mistake, arising from a prejudice which has sprung up against the latter material; one or two failures in bridges built with laterite being attributed to innate weakness of the stone in general instead of to want of care in choosing the quarry to be worked, and picking the stones for archwork—excellent laterite being available close at hand it was determined to resort to its use again next season, and sanction for rebuilding the arch (50 feet span) with it was received in time to allow of materials being collected by the end of the year. It is understood that the arch alone having to be rebuilt, little if any excess over the original estimate was caused by the accident, Overseer Graham's care having effected a considerable saving in the first instance.

---

* No. 3.

But the loss of money expended was far less worthy consideration than the renewal of that impediment to the traffic which had existed ever since the destruction of the two bridges, each of 2 small arches successively ruined at the spot 10 or 12 years before. It cannot fairly be imputed to Overseer Graham that the last failure was owing to want of care on his part, for the work had every attention that he could give it. It is presumed that he would have completed the arch work as successfully as he did the piling of the foundations and pavement of the nullah bed, had not the extent of his charge precluded his remaining constantly on the work which happens to be at the further end of the line from that where his Head Quarters are fixed. In fact his charge is much too extensive, embracing 110 miles, of which 40 consist of a ghaut and road through the mountainous region of Coorg, alone almost sufficient to occupy one man's time: Overseer Graham's health has been tried severely and will give way entirely if he is not relieved of work beyond his powers.

The Munjerabad Road—A trunk line, meeting the above at Pootoor and Mauny is yet unprovided with an Overseer, and it is high time that one should be appointed, the more so that for the season 1853-54 all work on that incomplete line of road (how incomplete, is shewn by Lieutenant Roberts' reports) has been suspended for want of an executive officer, which need not have been the case had a trustworthy Overseer like Graham been available. By limiting Overseer Graham's charge to the 75 miles from Fraserpett to Poottoor, and appointing another Overseer to the charge of the 60 miles from Mangalore to the Mysore frontier on Munjerabad Ghaut, a proper division of labour will be effected, the good results of which will speedily tell upon the state of the works.

Two timber bridges of considerable size were completed this year on the *road below Munjerabad Ghaut* by Lieutenant Wilkieson of the Engineers.

from plans prepared by the Superintending Engineer of Mysore. But much, very much, remained to be completed on the line when the monsoon put a stop to the works in June, after which that officer never returned to the spot but was succeeded late next season by Lieutenant Roberts. The constant changes in the superintendence of this important communication, and the divided responsibility of the management between Mysore and Canara officials have been fatal to the progress of the work, far more than any natural obstacles. Contrast it with the Perambodldy Ghaut and road between Cannanore and Hoonsoor, the difficulties on which were far greater and the works larger than those encountered on the Munjerabad line. Yet the former was completed from end to end and 2 lacs of Rupees expended in little more than a couple of years by the vigorous untrammelled exertions of the scientific officer who planned and traced the line originally ; while at the end of 10 years after an expenditure of half that sum the Canara portion of the latter line is still incomplete and likely to remain so.

On the *Jalsoor and Cassergode road*, a branch of the Sumpagee line, want of efficient superintendence was also felt this year. Under the care of Mr. Chase, the assistant Collector, the earth-work had been satisfactorily carried out on the traces laid down by the Engineer department, but for want even of a decent maistry the masonry work consisting of drains under 12 feet vent, was considerably bungled. Still the general purpose of the outlay has been gained, and a very useful 2d class road opened at a most insignificant cost. Traffic, trade, and salt returns tell us that no time should be lost in completing the communication for all seasons by bridges, of which few and small ones will suffice.

Of the *roads below Agoomby ghaut*, that to Oodapee and its port, Mulpy, was completed without bridges which yet remain desiderata on all three lines. Owing to gross carelessness on the part of a surveyor who had been deputed expressly to take sections of the nullahs the necessary plans could not be prepared in the assistant Engineer's office during the monsoon, as had been intended, the papers sent to him to work from being utterly untrustworthy. Each year's delay in bridging the roads below is to be deplored as preventing the benefit of the very complete line above the ghaut to Shemogah being fully attained. The interests of the trading ports of Mangalore, Mulpy, and Coondapoor, or the Government salt sales at Bajeh and Halandee, are either of them sufficient grounds whereon to incur a far heavier expenditure than will be asked for these works ; but without heads to plan, or hands to carry them out, (of which Canara may be said to be almost destitute in the present state of things,) it is hard to say when this great defect in the communications of the Coondapoor, Barcoor and Oodapee talooks will be removed.

It cannot be said that the *timber bridge* erected over the *Bilbyle nullah* on the Oodapee road this season, disproves the want of heads and hands on the public works of Canara. It does credit to the Assistant Collector, Mr. Chase, who built it, as evidencing the interest taken by him in the improvement of the district, but it is very questionable whether it is worth all the time he devoted to it, and which may have been so much taken from more important duties—and if the exertion of occasional energy on the part of active revenue officers has the effect of blinding higher authorities to the necessity of not being entirely dependent upon such well meant zeal, and inducing their acquiescence in the present state of things in the executive Department of Public Works, then is the zeal noxious that defers an organic change. One little work is pointed to with pride, in utter heedlessness of its disproportion to the requirements of the district and the necessity of introducing a system of operations in which such works should be multiplied at will. The bridge which has led to the above remarks is in two spans, of small size, on masonry abutments and pier, and is very serviceable in crossing a stream with high banks and steep approaches, the ascent or descent of which would be impracticable without its help. It is put together with such trusses and scantlings of timber as would do for double the span, but that is a mistake likely enough to occur in a first attempt.

Another *timber bridge* below the *Coloor ghaut* was built this season by the Coondapoor tahsildar, Soorappah, and does great credit to that very active public servant who takes the lead among his compeers for activity and intelligence in Marahmut operations. His bridge was built from the annual allowance for repairs to replace a rough timber structure put up by the late Lieutenant Carpendale, the pier of which (a huge wicker gabion filled with stones) had given way after some seasons' exposure. The tahsildar's bridge, though not trussed or framed in any way, is a great improvement over the generality of timber bridges designed and carried out by natives ; he has substituted squared timber at intervals, for rough trunks laid side by side, and plank flooring for the heavy earthen roadway usually carried.

The Coloor Ghaut and road on inspection after the monsoon of 1852, and during the very heavy rains of October, were found to be in admirable order which must be attributed to the narrowness of the surface exposed to wear which is 12 feet, the excellence of the soil, the annual repairs performed under a painstaking tahsildar, and lastly the absence of any cart traffic from which, though perfectly adapted, the state of the approaches within Nuggur cut it off, though only a few miles require making. But what can be done in Nuggur, without heads and hands, for public works, more than in Canara ? Major Onslow was known to be especially attentive to this branch of his work, but with one executive Officer and one Surveyor at his disposal he could take up new work slowly.

Byndoor Hill, and road to Bhatcul—On the coast road between the two small ports just named, occurs one of those obstacles peculiar to Canara, a range of flat topped laterite hill, between 200 and 300 feet high, rising abruptly out of the plain on the sea level, not to be turned, and ascended on either side by flights of steps and inclines almost insurmountable by laden cattle, (like those at Goorpoor and Mood Biddree on the road from Mangalore to Agoomby.) That near Byndoor greatly obstructed the traffic along the coast road, and the Marahmut Superintendent of Canara was this year deputed to work out a carriage road up and down the hill in question on traces which were laid down by the Engineer Department, not exceeding 1 in 16 slope. The monsoon was chosen as a favorable season for carrying on the operations as the laterite stone and soil of which the hill is composed are more workable in the rains. The work was carried out by Joaó Machado with his usual energy and skill. He is a good specimen of his class, the native Christians of the West coast, who in character approach the European more closely than any other native caste. His natural turn for road work first brought him to notice, and led to his advancement in the forest department from whence he attained his present post.

The traffic by *Devamunny ghaut*, received great assistance this year from the completion of the 5 arched bridge over the Benny nullah, the largest stream on the line, the steep banks of which had hitherto presented terrible obstacles to laden carts. The junction below with Meerjan, and the change of situation of the salt koties to a more convenient spot, seemed to leave little more to be done on the line except providing more efficient means of crossing the Dewgah ferry, to plan which unfortunately there was no competent person available. But the state of the ghaut after the monsoon, was very lamentable, and resembled that described in the report for 1850. In fact the officer in charge and the revenue authorities seemed to think the matter irremediable except by metalling the line, a costly proceeding and impeding to the traffic, but in their opinion rendered necessary by the earlier opening of the season caused by the construction of bridges, which enabled the bulk of the goods to be brought to market immediately the coast was opened. But the proposition for metalling was overruled by the Assistant Civil Engineer who urged the experience of the preceding monsoon in proof that strict adherence to the rules then acted on would insure a good state of the ghaut and road. The superintendent of the line had newly joined the department before the monsoon, and was not sufficiently impressed with the necessity of attending to the consolidation of the road and preservation of a good surface by constant ramming in the rains, disturbing the earth as little as possible with the pickaxe or mamoty.

The great damage done to the Dharwar and Coompta road by thin wheeled carts again led to the consideration of a toll upon such as had not tires of a certain dimension; and the increase of traffic thronging the line, especially west of Sirey where several branches meet, seemed to render necessary either the widening of Devamunny ghaut or the opening of another in its vicinity leading to the same Port. But the actual establishment of a toll at Devamunny and the commencement of operations for making Lieutenant Collyer's Trace of a new Neelcoond ghaut available for cart traffic, belong to the next year's report.

The services of Lieutenant Searle of the 35th, ordered to rejoin his Regiment on service in Burmah being lost to the district, Lieutenant Babington of the 4th Regiment was appointed in his place. Both these officers have done credit to their selection.

The bridges on the *Kuttegaul and Meerjan branch road* were completed before the monsoon, and are thought to be the best built structures of the kind in the district, the old Fort of Meerjan affording stones of large size and perfect quality for their construction.

The short road from *Coomptah Town* to its harbour mouth was undertaken to facilitate the traffic of the place, but till the Custom House is removed to a point commanding both the creek and the bay, and the estimates for constructing a new saltwater bund and sluices, and a wharf, are acted on the full benefits of its construction will not be reaped.

Tuddry Port was this year connected with the salt pans of Sanekutta and the Arbyle ghaut road by a valuable little branch of 1½ mile in length, partly cut out of a very steep and rocky hill side, partly embanked through paddy fields and salt swamps, and partly rivetted along the river face. The work was laid out very carefully by the Engineer Department, and well though slowly executed under the Ankolah Tahsildar. Now that carts and cattle can make their way up to the very doors of the Custom House, there can be little doubt of Tuddry benefitting more largely than hitherto by the opening of the Arbyle ghaut—whether its present purely local trade will open into general importance worthy of its capabilities as a harbour remains to be seen.

Another small port, that of *Ankola*, this year commenced to have its communication properly opened out with the Arbyle ghaut, by the widening to 18 feet of a careful trace laid down by the Engineer Department through the difficult ground between Augasoor and the coast; materials also were in process of collection for laterite bridges and drains on the same portion of line, being of small size and favorably situated as regards the quarries. Some large streams between Augasoor and Hebbool, must eventually be provided with timber bridges like those to be built on the main line. This branch road may be extended with advantage to Bellikerry, which small port affords very safe anchorage and will offer great facilities for loading and unloading vessels of some tonnage, if proper wharfs and piers are provided.

Sumusgee road, a short feeder of the Devamunny line, but to be extended through the Dharwar country to the Bellary frontier, was completed this year, the masonry works consisting of a single-arched bridge of 30 feet span, and a few small drains. The line was traced and bridge foundations marked out by the Engineer Department, and work carried out creditably by the Soondah Tahsildar. This is the first completed link of a line of communication taken up by the Bombay Government, to be carried from the banks of the Toombudra at Hawanoor by Hawelhree and Aloor to join the Canara lines. The Humpsagur road now in progress in the Bellary district should be connected with it by an extension to Hawanoor.

In Soopah talook the 2d class road from Yellapoor to Hullial was completed, and its extension to the Dharwar Frontier at Mauvincope commenced, under the superintendence of Lieutenant Thornton of the Artillery, who also made some progress with the road from Yellapoor to the Frontier near Kirwutty, the direct continuation of the Arbyle Ghaut road into the cotton country. It will be necessary hereafter to widen the Yellapoor and Hullial line and provide with timber bridges the Nullahs which cross it, one of great size and two others forming considerable obstacles to traffic. What has hitherto been done at a very cheap rate has tended greatly to the comfort and security of travellers through a jungle where they are liable to encounter the attacks of thieves and wild animals.

The *Trace of a New Ghaut to Gairsoppah* on the North bank of the river was commenced towards the end of the year, under the superintendence of the Engineer Department, but a notice of the operations will be more in place in the report for 1853.

On the whole, it will be remarked that more activity in the Mahramut Department prevailed in the North of Canara, during 1852 than in the South, partly owing no doubt, to the necessity of making up for former neglect of the Balaghaut; but in great measure also to the want of efficient superintendence. The rough road work in South Canara may be said to have been in great measure cut out in previous years, and the finishing with masonry, or masonry and timber structures, remained to be undertaken ; one road alone, that below Sumpagee ghaut, being so completed. But not even a maistry competent to lay out and build drains less than 12 feet span, being available for the Cassorgode road; and the services of Engineer Executives for the road below Munjerabad ghaut being only temporarily to be obtained, not a single Surveyor or Overseer of the Engineer Department to be spared from Bellary (the other District of the 3d Division), and but *one* Assistant Civil Engineer available for general duties; perforce the space between Mangalore and Honore was all but totally neglected in an Engineering point of view.

In North Canara, the Masonry works were confined to the Dharwar and Coomptah road and its branches under zealous executive Officers aided by the Assistant Engineer, but neither the Arbyle line nor the communications between the chief towns could be improved, however much it was wished to take them in hand. Still there was rough roadwork to do in Soopah and Bilghy within our means of performance, and valuable improvements in the approaches to some of the ports which progressed well, shewing on the whole tolerable activity in the north, though the actual outlay was small. But what was done is quite insignificant compared with what ought to be done, and would be done if it were possible to increase the means of investigating projects and carrying them out in this fine district.

Civil Engineer's Office,
3d Division, Bellary District,
Pennacondah, 18*th July* 1854.

GEO. WARREN WALKER, LIEUT.,
Civil Engineer, 3d Division.

REPORT FOR THE YEAR 1852 UPON THE WORKS EXECUTED OR IN PROGRESS IN THE 4TH DIVISION, AND SOME REMARKS ON THE WORKS AND COMMUNICATIONS OF THE DIVISION.

The sum of money expended and charged in 1852, amounts to Rupees 171,840-0-5—as follows:—

North Arcot.

Cheyaur anicut,.................................. Channels and subsidiary works,.............	Rs.	31,177	5	3
Works of irrigation,....................................	„	72,989	1	11
Roads,..	„	401	14	0
Bridges,..	„	134	13	0
Public bungalows,.....................................	„	133	10	6
Cutcherries,..	„	1,101	6	1
Salt pans,...	„	0	0	0
Judicial buildings,....................................	„	757	8	3
Police do.	„	430	7	11
Public hospitals,......................................	„	102	1	6
Mahramut establishment,..........................	„	3,081	0	0
	„	110,309	4	5

Chengleput.

Works of irrigation,	Rs.	16,283	9	10
Roads,	„	11,270	4	7
Public Bungalows,	„	268	11	7
Cutcherries,	„	6	2	0
Mahramut establishment,	„	3,702	0	0
	Rupees...	61,530	12	0

North Arcot.

Anicut across the Cheyaur river to supply by means of a channel several tanks in Trivatoor and Wandiwash talooks in North Arcot.

2.—The Cheyaur channels, anicut, &c., were sanctioned in September 1851 for Rupees 31,475-15-11, commenced in November 1851 and completed in 1852, under the immediate supervision of Overseer Bush—the channels are 20 miles long, varying in width from 8 yards to 3 yards, with a maximum cutting for about 700 yards of 14 feet—the earth taken from the channel is placed alongside and immediately close to the channel, where it is required to form part of the channel bank—at other places, varying in distance up to 10 yards. Where the bank forms the side of the channel, it is rivetted with stone—the anicut is 385 feet long between the wing walls, is built of rubble masonry on wells—the body of the anicut is 5 feet above the bed of the river, it is 7 feet broad at base, and 5 feet broad at top ; the first apron is of rubble masonry covered with stone jelly in artificial hydraulic cement—it rests in the rear on wells. The 2d apron is of carefully laid stones, not set in mortar, and in rear of the sluices, rests on wells. The bridge piers are of brick in mortar, but the bridge at present is only temporary and of Palmyra trees. The sluices in the anicut are in two sets, each having six 5 feet openings, closed when necessary with planks. The head sluice of the channel has four openings, each of 4 feet 9 inches, worked as the anicut sluices. For the first 400 yards the channel is 8 yards broad on a level, after which it diminishes to 6 yards, and is on an average slope of 2 feet per mile, the slopes being distributed over hard soils—the masonry works are not of sufficient size or importance to render a description of them necessary or interesting, there are altogether 24, of which 12 are Calingulahs, either for easing the channel of water, or for passing it on from tank to tank, 3 bridges of communication of 12 feet width of roadway, and one serving both as a bridge and as an aqueduct for carrying the waste water of a tank over the channel. An aqueduct for carrying water for irrigation over the channel, and one, the Cuddavanoor aqueduct for the conveyance of the channel itself; and the remainder sluices for the supply of tanks. The only work which needs to be noticed, is the Cuddavanoor aqueduct for the conveyance of the channel over the supply to the Cuddavanoor tank; its length including side walls is 84 feet, it is 22 feet wide between the parapets, which are 4′ 6″ high, and is built thus wide and with a slope, that it may if necessary draw off the water of a larger than the present channel; it has four arches, each of six feet space, the piers 4 feet thick—the foundations 7 feet deep, with a front and rear retaining wall—and inverts—the soil on which it is built being very bad—at the extremities of the wings there are cross walls, and the whole length above is floored with stone jelly in mortar—it is built with 142¼ cubic yards of brick in chunam, and 558–15⅔ cubic yards of stone in chunam, and cost Rupees 1,021–15.

3. The amount sanctioned for the anicut, head sluice, and foot bridge Rupees 8,801–8–3, the work cost 7,072–2–0 the amount sanctioned for all the other works was Rupees 22,674–7–8, and work executed 24,105–3–3 shewing a saving on the anicut of Rupees 1,729–6–3, and an increase on the other works of Rupees 1,430–11–7 or a total saving of Rupees 298–10–8. The average price of materials on this work are given in Appendix Z.

4. The above work was completed within the year by the untiring zeal of Overseer Bush; and has since then been under the charge of an Overseer, who has also superintended other works.

5. It may not be out of place in this report to allude to the losses to Government by the want of care in the distribution of water, and in the positive losses occasioned by the indifference or worse than indifference of the ryots to the interests of others. The large tank of Mookoor when filled to its proper height, becomes the head for the tanks lower down the channel, and so jealous are the Mookoor people of the prosperity of others, that rather than suffer the water to go on in its proper channel, they continually let it off through the waste weirs. Again, I have been obliged to have padlocks put on to the sluices, this has been negatived by at night enlarging the orifices—in short, they care little whether they have more than they want, or how much they waste, provided they prevent their neighbour's supply—so long as the distribution of water is entrusted to the villagers, so long as sluices can be enlarged, or padlocks broken without the possibility of detection, so long must Government be content to lose a large amount of profit, there are doubtless certain obligations on those who have water courses in common; regulations against wasting water by draining off more than is necessary, regulations against stealing water. Nevertheless these evils exist, and the penalties I conclude are insufficient. In the appendix will be found a detailed statement of the advantages derived by Government from these works in Fusly 1,262 (11th July 1852 to 10th July 53.)

Trivatoor Talook.

Ayacut.	Cawn.	Rupees.	Highest Colln.	Lowest Colln.	Av. in 10 years.	F. 1262.
Nunjah.	1,201–6	18,340–8–1	Rs. 12,823–4	Rs. 6,491–1	10,132–5–1	R. 12,398–4

Wandiwash Talook.

Ayacut	Cawn	Rupees	Highest Colln.	Lowest Colln.	Av. in 10 years.	F 1262.
	2,394¼	30,048–7–8	32,231–0–9	13,072–12–4	R. 17,162–14–3	19,144–9–6

and it is expected that as the ryots feel confidence in the work, the cultivation will in addition to Fusly 1262 be cawnies 424⅜, and Rupees 5,840–13–11 in Trivatoor, and cawnies 926–6¾ and Rupees 13,532–15–2 in Wandiwash. See Appendix Y and X.

It is intended to extend and enlarge these channels, and improve some of the tanks filled by it.

Doosy Mamundoor new entrance to channel and head sluice.

6. This work was to ensure a better supply of water from the Palaur river to the Doosy Mamundoor tank, the old channel having at its entrance been silted up and the river having left that side, cutting a deeper channel for itself on the opposite side; the tank is an important one, holding an 18 months supply.

Ayacut.	Cawn.	Rupees.	Highest Coll.	Lowest Colln.
	2,378–6¾	32,175–8–8	1,840 Cawn. Rs. 24,915–13–0	1,466 Cawnies. Rs. 19,540–0–0

7. The cost of the work was for channel Rupees 4,073–4–5; head sluice Rupees 737–3–7; total Rupees 4,810–8. This work was carried away the first year after it was built. On the 16th October 1852, the river which had been standing against the head sluice to a depth of 7 feet for some days, suddenly between 2 o'clock and 6 o'clock P. M. rose to a height of 13* feet 6 inches, overtopped the sluice by 1 foot 6 inches, forced away the front of the wall above the piers, leaving them and the wing walls standing, but so shattered that it was necessary entirely to reconstruct the work.

8. The other works varying in amount from a few rupees up to 2,000 have been of the usual description, Calingulahs (or waste weirs) for easing tanks, sluices for the better distribution of water, stone facing for the protection of tank bunds, head sluices for regulating the influx of water to river channels.

9. In addition to the works above enumerated, there have been sanctioned for the year, and partially under execution as follows.

North Arcot.

Irrigation works			†21,137 15 9
See appendix V.	Not of irrigation.	Roads	23,505 6 10
		Judicial buildings.	1,105 11 10
		Rupees...	45,749 2 5

---

* A height attained in 1794, but not since.

† Exclusive of ordinary works.

Chengleput.

		Rs.	a.	p.
Irrigation works		*10,335	2	8
Not of irrigation	Repairs of travellers' bungalows	1,075	4	3
	do of revenue do			
	Roads: Formation of			
	Roads: Repairs of other roads			
	Ferry			
	Rupees...			

* See appendix U.

10. In addition to the works completed or sanctioned as above shewn, there are under construction as follows.

North Arcot.

Nagaputla tank, sanctioned 1st April 1850 for Rupees 6,066-6-10.

This work has not even up to the end of 1853 been completed, owing in a great measure to the difficulty of procuring labourers, it is on the eve of completion. The same remarks apply to the Auknamput tank, sanctioned 3d June 1851, for Rupees 2,337-2-4.

11. The Delavy tank, estimate Rupees 1,295-2-10, sanctioned 12th January 1852 has been postponed for the same reason. The Samulconah tank, estimate Rupees 3,046-7 7, sanctioned 12th January 1852, and the Mamundoor tank estimate Rupees 731-7-9, sanctioned on the 12th idem, have also been postponed, because the inhabitants of the country thereabouts are said to have suffered so much from fever that they are leaving the locality. Many other tanks have been repaired in Triputty talook, in which the above tanks are situated; and when they are complete, which they will be during 1854, the works in this talook will be in an efficient state. Some of the lands however are so highly assessed, that they cannot be cultivated.

12. During the preceding ten years, there have been no new works of great importance undertaken: the works have been principally of restoration, improvement, or for the prevention of accident—the Cheyaur anicut and channels have been sanctioned and executed in 1851-1852; channels from the Poiney at cost of Rupees 9,985-8-0 sanctioned 14th December 1852, have also been nearly completed under the supervision of Surveyor Bush, and when the head sluice, estimated cost Rupees 6,268-6-0, sanctioned 4th January 1854 is complete, which it will be in four months, many tanks in Sholinghur talook, hitherto dependent on rains, will be supplied from the river—extensions of these channels are contemplated, and the estimates in preparation. It is proposed to take a channel through a natural basin near Sholinghur, and forming there, at an expense of 25,000 Rupees, a reservoir 5 miles in

---

* Exclusive of ordinary works.

circumference, with a maximum depth of 30 feet for 23,000,000 cubic yards of water* the channel from that will run eastward to Moshoor on the ridge separating the valley of the Tritany river from that of the Cortellar, giving off branch channels on each side of it, this may cost 25 to 30,000 Rupees; it is intended also to give a channel at a cost of 6,000 Rupees from the Perancanjee tank, lately put into first rate order, which is now filled from the Poiney river, to the Mahendravady tank, which it is proposed to restore at a cost of about 110,000 Rupees, and which will be 13 miles in circumference,† with a maximum depth of 30 feet, and to contain 62,000,000 cubic yards of water.‡ Channels will also be taken on the left bank to Lalpett, and on to Raneepett, Ammoor &c. on the right bank to several tanks in Trivellum; an anicut at a cost of about 15,000 Rupees will also be required across the Poiney river near Mailpadey.

13. Sanction was given on the 13th September 1853 by this Government for Rupees 8,66,114, for the construction of an anicut across the Palaur river near Arcot, and for channels, extending on the right bank of the river into the Arcot and Trivatoor talooks, and on the left through the talooks of Cauverypauk, Conjeeveram, Munnamunglum, Sydapett, and Tripatoor to the sea. Many smaller anicuts costing insignificant sums, under perhaps 1,200 Rupees each, have been rebuilt or repaired, the Oolundy, Murdad, Beddecroor, Arasoor in Wandiwash talook, Ookul, Tandree, Murdum in Trivatoor, Tonewadoo and Coopedesathum in Arcot, the Vaniambady, Oodratoor, Kistnapooram anicuts in Vellore, and many tanks which need not be enumerated, have been materially improved, the works in Poloor, Wandiwash, Tripetty and Sholinghur talooks have been hitherto much neglected, efforts are now being made to rectify this. Most of the important works in the district are in good order, and there are few not absolutely ruined, which are not in fair working order; and of the ruined tanks the

Pallicondah tank estimate cost of repair	4,209	14	4
Bomasamoodrum do.	7,287	10	3
Peddamadinga do.	7,311	6	6

are to be repaired immediately.

The following buildings have been built within the period under review:

	When built.	Cost.		
New Cutcherry at Chundragherry	1852 ...	1,801	6	1
Additions to the Huzzoor Cutcherry at Chittoor.	1853 ...	2,589	9	9
Jail at Chittoor, provided with ridge ventilators.	„ ...	626	7	0
Public Hospital at do., (rented,) repaired.	„ ...	102	1	6

---

* Which at 1,000 cubic yards per Rupee is equal to 23,000 Rupees value.

† Superficial area of 5 miles.

‡ Which at 1,000 cubic yards per Rupee is equal to 62,000 Rupees value.

Police Cutcherry at Vellore	1853	1,358	1	4	Est. amt.
Cutwall's Choultry at do.	„	759	6	6	do. do.
Police Cutcherry at Wallajahnuggur	„	170	2	8	do. do.
Do. do. at Maderpauk	1851	372	4	1	
Do. do. at Damulcherroo	„	472	13	3	do. do.
Do. do. at Cungoondy	1852	368	9	11	
Do. do. at Tritany	„	368	9	11	
Do. do. at Poloor	1853	264	12	0	
Do. do. at Amboor (sanctioned)	„	1,060	12	1	
Cutcherry at Chittoor	„	2,184	14	4	
Do. at Palmanair (building)	„	1,969	11	7	
Do. at Wandiwash (rebuilt)	1849	2,302	1	0	
Do. at Naglapooram	1850	843	1	0	
Do. at Arcot (repaired)	1849	614	15	0	

and various minor repairs to Bungalows, Cutcherries, Police buildings, &c.

14. *Roads.*—Before describing the state of the roads in North Arcot, it may be well first to observe that Madras is surrounded on the land side by the 4th division, and that three trunk roads diverge from it; one going south through Chengleput, one west through Poonamallee, Arcot, Vellore and Vaniambady to Salem and Bangalore, from which at Arcot, another road goes through Chittoor and Palmanair to Bangalore—a third northwards through Sooloorpett to Nellore; and from Chittoor there is in progress a road from Damulcherroo ghaut to Cuddapah, these roads are under the supervision of the Superintendent of Roads, and are more particularly described by him. Of the communications under my immediate care, there is little to be said, they are, though in process of amendment, bad. They may be described as follows:

15. Road from Vellore to Bomasamoodrum joining the trunk road from Arcot to Chittoor, sanctioned on the 10th July 1851, and cost Rupees 9,974-2.

16. This road is now all but complete—parapets to one or two bridges only required—it is bridged throughout, except across the Palaur river, and the metalling is almost completed—it has been opened to traffic for some months, and is an excellent road. The number and dimensions of bridges are as follows,

	No.
Tunnels......1 arch of 3 feet span	2
do.........1 do. of 4 do.	1
Askew do. 2 do. of 1—4½ feet and 1—2½ feet span.	1
Barrel drain—1¼ foot diameter	16
Askew Bridge—3 arches—each of 16 feet span—Angle of Askew 10°	1

Askew Bridge—3 arches—each of 12½ feet span—Angle of Askew 10°..................................	1	Complete less Parapet walls.
Bridge............1 arch of 28 feet span	1	
do. ....1 arch of 10 feet span	5	
do. ....2 arches each 10 feet span..............	1	
Road dams—from 6 to 40 yards long...... .... each	22	

17. Disbursed up to the end of December 1853, Rupees 9,474-2-0, additional sanction of Rupees 420-5-4, was obtained for a portion of the road to complete its junction with the Arcot and Chittoor road—and a sum of 296-3-4 Rupees, was expended for repairing damages caused in March 1853.

		M.	F.
Length of road.........		9	4
Estimate........Rs.	9,974	2	0
Additional......	420	5	4
Do.	296	3	4
	10,690	10	8

18. The sum of money expended on this road, considering that it is really a very good one, is very little—the estimate was too small in the first instance, and had it not been for the very close supervision of Mr. Sullivan the Head Assistant Collector, in the absence of an Assistant Civil Engineer, it would have no doubt considerably exceeded the estimate.

19. This may be taken as part of a communication from Cuddapah through Damulcherroo, Chittoor, Vellore, Arnee, Gingee, to the south. From Vellore southwards, the road is as bad as can be, (sanction was obtained for Rupees 160 for a tracing for an estimate, which is now nearly complete) the worst portion of it, the Caneambady ghaut at a slope of 1 in 6 has been shut up—a new Ghaut at 1 in 20 having been opened ½ a mile to the south, by which a saving of ½ a mile in distance has also been effected, and one or two small bridges built or being built—cost of improvement Rupees 1,167-4.

20. At Arnee, a road strikes off through Poloor, Calispaucum, Teroonamallee to the Salem district. For repairing the worst portion of this, sanction has been received, amounting to Rupees 1,223-6-10, and Rupees 9,608-11-11, of which the former sum has been nearly expended. The traffic on this road is very considerable, on average, 100 bandies, 85 bullocks, 13 Horses, 8 asses, and passengers 320 per day. There is a cross road from Arcot to Wandiwash through Trivatoor, which has been improved at Trivatoor by building two bridges and making a causeway of 9 feet high across a low swampy place yards long, sometimes impassable, at a cost of Rupees

21. *Conjeeveram to Thellar*—this road partly in Chengleput, principally in North Arcot, joins Conjeeveram to the Southern or Madras and Trichinopoly road at Tindevanum. On the portion of it in this Division between Conjeeveram and Thellar, distance 34 miles, Rupees 4,058-11-4 were expended in improvements in 1850 ; in 1853, a further sum of Rupees 11,564-11-8 was sanctioned, and preparation is being made for commencing

the work. This provides for tunnels and drains, but not for bridging the Sookunuddy, the Cheyaur, the Palaur and the Vagavuthy rivers. The traffic on this road consists, besides the usual traffic of produce, of a vast number of pilgrims on foot and in conveyances, crowding to Tritany, Tripetty, Conjeeveram, Seerungum, and Ramiswaram.* This road may be considered as portion of the pilgrim road from Ramiswaram to Tripotty, and should eventually be repaired between Conjeeveram and Nagery.

22. *Nagery through Kaniambady and Balapillay to Cuddapah.* This portion of road is part of the communication above alluded to, and is also part of the road from Cuddapah to Madras by Nagery, Conacamma Chuttrum, Tripasore and Poonamallee to Madras, of this road, the portion between Nagery and Kurcumbady 26 miles, is under repair at a cost of Rupees 6,000, sanctioned 14th August 1852. The Nagery Ghaut has been reformed and is now easy for carriages. The Vudlamuttypet Ghaut is in progress, and other portions are in different stages of repair or reformation, the slowness of the repairs is attributable to the difficulty of procuring labourers. I am in hopes however the repairs will be completed this year. An additional sum of Rupees 6,102-2-10 for some bridges and tunnels, has also been sanctioned 27th February 1854.

23. *Chittoor to Kurcambady*, distance 49 miles, sanction was obtained on 21st September 1852, for Rupees 15,878 -11-0, for making an unmetalled road through the valley running up from Chittoor to Cotah-cotah, and down thence by Punnapauk, Chundgherry and Tripetty to Kurcambady, it is part of a communication from Bangalore via Chittoor to Naidoopett in the Nellore district (to which latter place or to Agarum on the North road near Sooloorpett there should be communication through Calastry). This part of the country is fertile, and having lately had attention paid to the works of irrigation—required the road; less progress has been made than I could wish from the difficulty of procuring labourers. A portion of this road, 10 miles, from Chittoor to Pulalput, forming a portion of the trunk road from Chittoor to Cuddapah has been transferred to the Road department.

24. *Wallajahpett to Sholinghur*, distance 15½ miles, sanctioned 27th January, 1853—for Rupees 6,845-3-3. This road is in progress, it is an important communication, connecting Wallajahnuggur and Sholinghur with the railway which passes between them, this road will be bridged, and must eventually be metalled, it forms part of the communication from Arnee by Arcot and Sholinghur to Tritany and Tripetty.

25. The roads wanted in North Arcot in addition to the above, are, a road from Palmanair through Cuddaputtum, Vencataghorry Cottah, to Cungoondy, where the branch railway from Vaniambady to Bangalore ascends the Eastern Ghauts, and a carriage road down the Ghaut from Cuddaputtum

to Gooriattum, to join the railway there, is also much required. For the former, a survey has been made, and an estimate is in preparation; a road from Gooriattum to Pallicondah is also necessary, and another from Gooriattum through Purduramah to Chittoor; a road from Chittoor to Sholinghur and thence to the railway at Cullatoor, will no doubt be necessary—a better communication between Nagery, Naglapooram, Sutvaid and Perivut Chuttrum or Tattarypollium on the Northern road is also desirable.

26. The district of Chengleput differs in features from North Arcot, being flat for the most part, sandy, subject to inundations during the monsoon from the occasional overflowing of the Narnaveram, Corteliar and Palaur rivers, and consequently more money is expended for the repairs of the works in this, though one of the smallest districts, than in any other, Tanjore alone excepted. As in Arcot, little has been expended in Chengleput in new projects—the works being confined to repair, improvement, or conservation of existing works, and very considerable sums have been expended on some of the more important tanks as follows,

	When repaired.		Cost.
Chumbrumbaucum tank	1848	11,536 4 0	16,163 8 10
	1849	3,362 13 0	
	1852	1,264 7 10	
Bungar channel	1851	———	4,242 6 0
Tennairy tank	1848	———	5,679 4 0
Porel tank	1850	2,389 14 0	3,657 4 0
Channel	1852	1,267 6 0	
Vellacharry tank	1851	———	651 12 0
Manumbady do.	1848	———	1,727 11 0
Munnymungalum tank	1850	———	1,872 15 0
Cooum tank—bank and Calingulah	1849	———	1,158 12 0
	1852	———	2,036 1 10
	1853–54.. (in progress)		3,436 6 0
Govindavady tank Supply channel, Earthwork and Calingulah	1850	———	1,369 13 0
	1853–54. (in progress)		1,779 2 9 2,542 9 0
Parundoor tank	1849	———	481 4 0
	1853–54.. (in progress)		699 3 4
Govindavady spring channel and Chittary supply channel	1850	———	928 8 0
Streepermatoor tank and supply channel	1849	2,322 14 0	
Damul tank	1853-54..	2,598 10 4	In progress.
Caucavanum	1851	2,787 3 0	

	When repaired.		Cost.
Catoor	1849	309 1 0	
Paroor	1847	259 10 0 395 1 0	654 11 0
Madranticum tank	1848 1849 1850 1851	1,034 2 0 499 0 0 1,954 5 0 1,878 6 0	4,965 13 0
Tuttamunchy do.	1849	1,259 8 0	
Ootummaloor channel tanks	1851	800 15 0	Amount of Estimate.
Boodoor and Palliput channels	1850	2,322 14 0	
Paloor do	1850	3,418 1 0	Cost.
Salavaukum channel and aqueduct	1850 1851	1,098 8 0 586 15 0	1,685 7 0
Pennagrum supply channel.	1851	1,791 0 0	

27. There is nothing particularly interesting in the above works, there being nothing instructive in their construction or repairs, the Bungar channel is the main supply channel of the Chumbrumbaukum tank, and had been filled up for some years, it was re-opened in 1851, on Estimate of Rupees 4,242-6-0, and has been no doubt very remunerative ; it is contemplated to erect an anicut across the Corteliar at the spot where the Bungar channel is taken from it, at a cost of Rupees 9,932-3-3. An extension of the present anicut across the Cooum at Coratoor, which keeps up the Bungar channel there, directing it on to Chumbrumbaukum, has been sanctioned on an estimate of Rupees 16,357-14-1 ; by means of these works, I hope that the Chumbrumbaukum tank having an ayacut revenue of Rupees 62,068-0-0 fluctuating from Rupees 21,740 in Fusly 56, to Rupees 47,140 in Fusly 58, will be kept constantly full, the water in the Corteliar being about to be much increased by the supply which it will receive through the channels from the Poiney and Palaur rivers.

		Rs.
Fusly	1256	9,216
	1257	11,000
	1258	12,771
	1259	8,952

28. The Cooum tank is a fine tank, having ayacut cawnies 1,766 of Rupees 16,234, but owing to its being built of very bad soil, it was never kept properly full ; the late Civil Engineer built a large Calingulah to it, and it has now been faced with stone. Many other tanks injured and damaged in 1846, and repaired in 1847 by the late Civil Engineer in which year Rupees 106,081-1-7, were expended, have been improved by Calingulahs and stone facings, and with good result, the expenditure in 1851, consequent on the storms of May having been Rupees 26,092, and the ordinary in that year 20,310-2-0, in all Rupees 46,402-2-0. Attention has been paid to the confinement of the water of the

Corteliar and Narnaveram rivers by river embankments and head sluices to the channels from it.

29. These river embankments are not extensive or costly, they have been erected where the river banks are low, and have been placed at unequal distances from the river bank following, as much as possible, the sort of ridge formed at no great distance from the banks of all delta rivers. This has been done with a view of altering the depth of the bed of the river as little as possible, leaving it as much to its own course as the protection from inundation of the adjacent fields would admit. They have been made with slopes of 2 to 1 or 3 to 1 on the river side and turfed, and no higher than is absolutely necessary, they have been of no great length (the longest being 3,125 yards) and the maximum cost Rupees 551, and as works of skill are undeserving of notice : they will however when fully carried out, be practically useful, in preventing valuable land from being destroyed, either by covering it with sand or carrying away the soil, and in the prevention of the destruction of tanks.

30. In addition to the tanks in the 4th Division which are very numerous, not fewer than 6,000, and river channels for filling tanks, there are numerous small channels, taken from springs in the rivers, or from springs from other sources, and much cultivation by means of wells, in the northern part of Chengleput there is also a considerable deal of cultivation, carried on by retaining the rain water on flats by small banks : this serves to produce an inferior description of rice called M[illegible]nnaculty. The want of continually flowing rivers in this district has necessitated this formation of tanks, and renders the irrigation expensive ; almost every available spot for a tank has been used for their formation. Many of the principal ones have supplies from the rivers, but having no anicuts over which any quantity of water may run without carrying them away, as it does the temporary sand embankments in common use, the supply is often lost. The Palaur, Poiney, Corteliar, and Cooum anicuts will effect a very material change in this respect, putting the district even in such seasons of drought as 1849 and 1850, on the footing of average years.

31. There are but few ruined works in the Chengleput district ; there is the Cumbun Culvay, a filled up channel, traversing the district in its whole length, the restoration of which is part of the Palaur anicut project ; the Pumbul tank immediately above Palaveram has been an immense work—its bed is now cultivated from the Chumbrumbaukum tank, and its restoration would swamp more ground than there is below it, fit for cultivation—but it might be restored as a reservoir for supplying Madras with water, or the Porel tank might at a small expense be used for the same pur-

pose—there is apparently here and there, traces of a channel from near Pumbul tank towards Guindy, and it may perhaps be profitable to re-open it, partly to fill tanks, and partly as a feeder if requiréd, to the proposed southern canal, for a portion of which from the Ádyar through Çovelong to the Palaur river distance 40 miles, an estimate of Rupees 175,715-11-1, has been forwarded to Government. There is a large ruined tank near Poonamallee called Agarum which it would not pay to repair, and there is the remains of a gigantic work which I believe to have been a failure across the Narnaveram river at Kistnapooram, from which I however intend to have levels taken for the purpose of carrying channels along the northern part of the Peddapollium talook.

32. One or two minor projects are in readiness, but not yet forwarded for sanction.

33. Public buildings built during the last 10 years.

	Sanctioned.	Cost.		
Dispensary and Public Hospital at Chengleput	1851...	4,500	0	0
Court House enlarged at do.	„ ...	2,049	15	0
Poonamallee Cutcherry enlarged	1849...	1,717	12	4
Conjeeveram talook Cutcherry, enlarged	1850...	472	3	10
Ootramaloor do. do.	„ ...	701	9	8
Munnamungalum do. do.				
Carangoly Cutcherry, repaired	1848...	259	15	6
Jail at Chengleput do.	1852...	589	7	0
Goodyvaucherry Traveller's Bungalow built.	1848...	2,418	7	0
Police Tannah at Poonamallee	1853...	269	4	6
do. at Sydapett	1850...	233	14	0
do. at Ponery, required	1853...	311	11	0 required.
Cutcherry at Stree Hurry Cotah, required.	„ ...	1,730	7	1 required.

The repairs and small improvements to the Public Bungalows in the division of which there are between 50 and 60, need no description.

34. Of the roads in this district, the three principal, the south, north, and west have been already alluded to. Of the cross roads, the road from Soorapen's chuttrum, leaving the western road 3 miles east of Baul Chitty's chuttrum, and going through Conjeeveram and Wallajahbad to Chengleput was sanctioned to be repaired at a cost of Rupees 6,917-13-2; this is in progress and will be finished this year, the road is unmetalled, and from the very sandy nature of the soil, will never in dry weather be a very good one, nor could it be made so, except at a very large outlay, the old bridges have been repaired, and new bridges and tunnels built, for one of the bridges.

a bridge of 5 arches each of 32 feet span and 26 feet to intrados from bed of river, a sum of Rs. 12,043-9-7 was sanctioned, and the bridge built and opened in 1850 ; the continuation of this road to Sadras is going on, on the discretionary allowance granted to the Collector.

35. A road of 2 miles in length across the bund of the Conery coopum tank to connect Conjeeveram with the western road at M'Lean's chuttrum, was finished in 1852, at a cost of Rupees 2,394-3.

36. The old Pioneer road from Madras to Bangalore through Poonamallee, Coratoor, Perimbaucum, Alapaucum, Trivellum, Gooriattum, Naickenary, has been allowed to go entirely to ruin, having been superseded by the present western road, and the coast road from Madras through Vannien's chuttrum, Sadras, * Chunampet, on which very large sums must have been expended, has also become entirely useless, the road through Chengleput having rendered its repairs inexpedient.

37. The road from the Mylapoor tank at Sydapett from Madras to Streepermatoor by Coratoor, bridged and tunnelled throughout, has long been out of repair. An estimate for this amounting to Rupees 5,280-0-0 is before Government.

38. A road from Saint Thomas' Mount to Poonamallee, a distance of 6 miles has also been surveyed and estimated for, it is to be bridged and metalled throughout, the estimated cost is Rupees 31,335-11-6, of which 16,207-8-7 is for a bridge of 9 arches across the Adyar river.

39. The road from Madras to Cuddapah via Poonamallee, Tripassoor, Nagery, Balapillay was estimated for construction in 1851 ; the estimate as far as Balapillay from Poonamallee amounted to Rupees 76,650-11-2 ; it was not sanctioned, but a sum of 6,000 Rupees was sanctioned for improving the worst parts between Nagery and Balapillay, and is reported on in the North Arcot roads.

40. Since that time the direction of the railway has been determined upon, and a survey and estimate is in preparation for repairing the road from Poonamallee to Coratoor, thence to Dacumbode, where it crosses the railway, and where there will be a station to Tripassoor, and to the Narnaveram river. The necessity of a road thence to Nagery may be obviated, if there is a railway via Naglapooram to Cuddapah, in which case there should be a road from Tripassoor to Oodiatoor by Oodipe.

41. The road from Madras to Naglapooram via Porel will also be superseded by this rail.

---

* For the repair of the road from Chunampet Salt pans to Tindevanum sanction was granted on the 16th June 1853, for Rupees 1,794-11-2.

42. The road from Madras to Ennore was reconstructed in 1852, at an expense of Rupees 8,974-9-1, but the utility of this road, except as a means of communication for the residents at Ennore has, as well as the old road to Pulicat and Sooloorpett, been superseded by the canal.

43. A cross road from Conjeeveram to Nagery, one from Wallajahbad to Streepermatoor and Dacumbode crossing the Cooum by the bridge of the Coratoor and Dacumbode road, will also be necessary.

44. A road is much required from Chengleput to Ootiamatoor and another from Poiney to Tachoor, these are in contemplation if not in actual construction under the Collector on the discretionary allowance.

45. The sums expended during the last 10 years ending in 1851 in the two Collectorates, are as follows,

See Appendix C. and D. for North Arcot.

See Appendix A. and B. for Chengleput.

	North Arcot.	*Chengleput.*
Irrigation........	430,677 1 5	495,576 14 1
Non-irrigation...	67,574 1 4	54,470 3 2
Total...	498,251 2 9	550,047 1 3

The cost of the establishment for those 10 years are,

	North Arcot.	Chengleput.
Engineer's Establishment ..	125,178 0 0	79,090 10 10
Collector's ditto	23,186 15 11	37,066 1 7
Total...	148,364 15 11	116,156 12 5

For the account particulars see appendices C. D. B. A.

46. During the year 1852, the establishment in the 4th Division of the Civil Engineer's department, and their employment, was as follows.

Civil Engineer, Captain Collyer, inspected, estimated for, or visited while in process 280 works, made several visits to the Cheyaur anicut and works, examined the Ghauts between Naickenary and Palmanair, and projected the Poiney channel.

2nd Lieutenant Denison, 2nd Assistant Civil Engineer, superintended construction of roads and bridges between Panantor, Vellore, and Caneambady, and inspected a few works in the neighbourhood. Embarked for Burmah, 17th March.

Assistant Revenue Surveyor Dick, employed in surveying and taking levels for the Poiney channels, superintended for a short time the Panantoor and Vellore road, and visited about 90 works and made some other surveys for settling disputes.

Overseer Bush, was employed in the Cheyaur works.

Overseers Lincoln and Downie, joined in December 1852.

47. In addition to the road communications there is the Northern Canal, extending from Madras to Ennore by a canal called Cochrane's canal, thence to Pulicat by a narrow backwater, and thence to Sooloorpett on the west side of the Pulicat cut.

48. An extension of this navigation, leaving Sooloorpett to the left, is now being carried on from a place on the east side of, and opposite to Sooloorpett lake, called Streehurry cottah or Cusbah-coil to Doogarasaputnam, a distance of 22 miles, which will extend the navigation to within 40 miles of Nellore ; the sum sanctioned for this work and improving two very tortuous parts of the channel near Pulicat is 47,000 Rupees, and I am in great hopes it will be completed this year.

49. The results of some of the more important works are shewn in appendix E. for North Arcot, and Appendix F. for Chengleput.

G. C. COLLYER, Captain,

Civil Engineer, 4th Division

In Camp, Calumboor. North Arcot,
March 27th, 1854.

APPENDIX E.

Statement shewing the results of certain works of irrigation executed in the District of North Arcot.

Names of the works.	Year of completion.	Cost.			Average yearly revenue of the five years preceding the commencement of the work.			Average yearly revenue since the work was completed showing the No. of years.				Annual Average gain in Revenue.		
								No. of years.	Amount.					
		Rs.	A.	P.	Rs.	A.	P.		Rs.	A.	P.	Rs.	A.	P.
Excavating spring channel to supply Keelapolum Malapolum tank in Cauveripauk Talook..........	1848	835	0	0	20	9	0	3	571	6	9	550	13	9
Constructing an Anicut to supply the Cooppady South tank in Arcot Do..	1851	1,183	2	0	786	13	8	2	907	1	3	120	3	7
Constructing an Anicut to supply the Tonemadoo tank in Do..................	1851	417	2	0	231	1	0	2	280	15	4	49	14	4
Excavating a channel to supply the Yalachairy tank in Trivatoor Do.	1850	688	6	0	961	11	3	2	1,141	0	1	179	4	10
Constructing an Anicut to supply the Ookul tank in Do..........................	1850	489	14	0	1,122	3	6	3	1,179	4	9	57	1	3
Constructing an Anicut to supply the Caloor tank in Do........................	1850	429	8	0	2,386	12	10	3	2,592	0	11	205	4	1
Excavating a channel to supply Tundra Somauput tank in Do......	1851	1,079	2	0	640	9	0	2	917	9	9	277	0	9
Constructing an Anicut to supply the Murdum tank in Do..........................	1851	240	4	0	289	5	11	2	354	10	0	65	4	1
Excavating a channel to supply Codanugger tank in Do..............................	1851	354	15	0	1,344	13	9	2	1,599	0	9	254	3	0
Constructing an Anicut to supply the Oodiatoor tank in Vellore Talook.........	1852	1,220	2	8	1,152	7	8	1	1,223	3	0	70	11	4
Constructing an Anicut to supply Tippasamoodrum tank in Do..................	1852	421	12	9	1,154	4	9	1	1,334	7	3	180	2	6
Constructing an Anicut to supply Vaniembaudy tank in Do......................	1852	441	5	9	1,216	1	1	1	1,487	14	3	271	13	2
Repairing an Anicut on the Soocanady River to supply Murdaud tank in Wandiwash Do............	1850	1,396	5	0	3,233	0	0	2	3,969	4	6	736	4	6
Constructing an Anicut to supply the Oolunday tank in Do.......................	1851	1,017	8	3	1,150	8	1	2	1,348	11	4	198	3	3
Constructing an Anicut to supply the Arasoor tank in Do..........................	1851	572	1	0	544	10	11	2	963	14	3	419	3	4

North Arcot,
Collector's Circuit Cutcherry,

E. E. Per J. D. BOURDILLON,

Collector.

APPENDIX F.

Memorandum shewing the results of special works in the Chengleput District for 1852.

Names of works.	Year in which it was executed and the original cost.				Subsequent expenditure prior to 1852.			Expenditure in 1852.			Ayeant Beriz.			Highest Revenue prior to the execution of the work.				Average Revenue of 5 years prior to the execution of the work.			Highest Revenue after the completion of the work.				Revenue of F. 1261.			Revenue of F. 1262.		
	Year	Rs.	A.	P.										F.							F.									
Manapaukum River Channel .	1847	1,106	6	...	809	...	...	......	...	...	2,559	...	...	1251	854	...	...	553	...	...	1261	1,152	...	...	1,452	...	...	1,306	...	...
Porel Channel.	1839	10,686	4	4	3,915	8	..	2,551	2	..	10,672	12	...	1247	4,665	...	...	4,305	...	...	1258	8,932	...	...	5,857	...	...			
Poorsevankum Spring Channel.	1848	1,601	14	...	173	11	..	......	...	..	1,183	15	...	1256	887	...	...	698	...	...	1262	1,166	...	...	1,131	...	...	1,166	...	...
Columalapootoor &c. channels	do.	997	15	...	313	8	...	......	...	...	794	14	...	do.	794	14	...	697	...	...	1261	968	11	...	968	11	...	863	...	...
Paloor Channel.	......	3,418	1	...	......	...	...	......	...	...	11,761	..	..	1247	5,438	...	..	......	...	...	126	5,551	...	...	......	...	...	5,551	...	...

(Signed) J. H. COCHRANE,
Collector.

APPENDIX C.

Occasional works sanctioned in 1852, begun but not completed within 1852 and those postponed for execution in 1853.

		Years.	Amount of Sanction.	Works completed in 1852.			Works begun but not completed within 1852.		Amount of works not begun in 1852.
				Amount of cost.	Saving.	Increase.	Amount expended to the end of 1852.	Sum required to complete.	
Irrigation of works		1852	10,335 2 8	3,610 12 0	314 6 10	0 0 0	401 4 0	211 6 0	5,797 5 10
			10,335 2 8	3,610 12 0	314 6 10	0 0 0	401 4 0	211 6 0	5,797 5 10
Works not of Irrigation.	General Buildings	1852	75 2 3	75 2 0	0 0 3	0 0 0	0 0 0	0 0 0	0 0 0
	Judicial Buildings	1852	589 7 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	589 7 0
	Ecclesiastical do.	1852	410 11 0	361 15 0	48 12 0	0 0 0	0 0 0	0 0 0	0 0 0
Total not of Irrigation			1,075 4 3	437 1 0	48 12 3	0 0 0	0 0 0	0 0 0	589 7 0
Total of Irrigation and not of Irrigation			11,410 6 11	4,047 13 0	363 3 1	0 0 0	401 4 0	211 6 0	6,386 12 10

Statement of Revenue of th

Villages.		Number of months supply from the tank before the Poorsa tank received its supply from the Cheyaur channel.	Number of months supply since Poorsa tank received its supply in the present year.		Ayacut.				
					Poonjah.				
					Canee.	Teerva.			Ca
Number.	Name.					Rs.	A	P	
12	Cooveloor	6	8	10*	305- 5	1,137	7	6	20
49	Pooreesay	12	15	18*	254- 0	756	1	6	29
47	Yetchoor	6	8	12*	232-14	706	3	6	19
23	Vadanaugoor	5	5	11*	60- 8½	188	8	0	6
42	Thennaugoor	6	6	11*	157- 3	572	11	0	12
146	Cacarum	5	5	8*	144-13¼	483	0	4	4
10	Oolapaukum	Sowinthereyapoorum Tunnel			48 4	151	12	2	7
35	Sowinthereyapoorum	4	8	10*	100-15¼	243	5	9	6
11	Cosaput	Cacarum Tankul	0	0	103- 3¾	301	3	11	6.
144	Velduputtoo	Do.	0	0	84 - 0	230	14	3	4
147	Nadooput	Do.	0	0	32- 6¼	94	11	1	1
166	Vadoor	5	5	8*	202- 10½	735	3	0	16
167	Covil Coopum	2	2	3*	64- 6	203	1	9	2
157	Agurrum	4	4	5*	38 - 2¼	93	10	0	[illegible]
163	Sathemnoor	4	4	6*	136 5	440	12	0	[illegible]
170	Keelpaukum	5	5	7*	219- 8½	737	8	3	[illegible]
158	Covalay	6	6	0	736-13	2,576	4	6	51
141	Pioor	6	6	0	926	317	15	[illegible]	4
25	Alathoory	6	6	0	102-14½	230	13	[illegible]	11
44	Culpaukum	3	3	6*	132- 2⅛	390	13	2	11
165	Velancaudoo	4	4	6*	157- 6¼	440	11	2	4
136	Alletaukul	2	2	3*	46- 1¾	110	5	9	1
137	Voyapaukum	Cacarum Tankul	0	0	69 - 9½	177	3	5	4
154	Aleathoor	4	4	6*	148-12¾	489	9	10	8
155	Keelnurmah	4	4	0	116- 2	43	3	6	5
39	Pooleevoy	4	4	0	159 -14¼	333	15	2	4
161	Yaroompadoo	4	4	0	223- 5	731	1	0	13
		107	118	130*	4,099-18⅙	12,918	2	3	2,3

N. B.—The figures marked with Asterisks are t

APPENDIX Z.

Memorandum of Average Rates paid on the Cheyaur Works.

	Rs.	A.	P.
Rough stone per cubic yard on Anicut,	0	5	9
do. do. other works,	0	5	$1\frac{5}{8}$
Chunam (carted where required) 24 Parah,*	3	8	0
do. not carted 28 do.	3	8	0
Bricks per 1000, including Carriage on average,	1	5	$8\frac{1}{4}$ nearly.
do. do. inclusive do. from	0	14	0
	1	0	0
Cut stone per cubic foot (Cut 1 line),	0	3	$4\frac{1}{2}$
Bandies per load, average distance $3\frac{1}{4}$ miles,	0	3	0
Bricklayers each,	0	5	$8\frac{1}{2}$
Men coolies,	0	1	$9\frac{4}{7}\frac{3}{5}\frac{8}{3}\frac{5}{2}$
Women do.,	0	1	$5\frac{}{2}\frac{1}{4}\frac{1}{5}\frac{}{7}$
Boys,	0	1	0
Baling water per cooly, Working in reliefs day and night, 12 hours,	0	3	$2\frac{4}{9}\frac{4}{7}\frac{8}{5}$
Sinking wells per cooly,	0	2	$9\frac{1}{5}\frac{2}{7}$†
per well 5—6 average,	3	5	3
Carpenters each,	0	4	$5\frac{1}{2}$
Smiths,	0	5	$1\frac{7}{2}$,
Rough stone in chunam per cubic yard,	1	6	8 nearly.

EARTHWORK.

Top Yard
2d do.
3d do.
4th do.
5th do.

Average per yard on all earth $10\frac{3\frac{1}{2}}{16}$ throughout.

Channel commenced on 6th November 1851, and completed on the 24th October 1852; Masonry 19th January 1852, and completed 28th August 1852, nearly all the Calingulahs are coped with cut stone from ruined Muntapums.

The only accident during the work was one man severely wounded while blasting rock, since recovered.

G. C. COLLYER, CAPTAIN,
Civil Engineer.

REPORT ON THE PROGRESS OF PUBLIC WORKS IN THE DISTRICT OF SOUTH ARCOT FOR THE YEAR 1852.

The more important works under execution and the amount expended during the year.

1. The bills of expenditure under the head of Public works exhibit but few items exceeding in amount 1,000 Rupees and consist of:

---

* Parahs 24″ × 24″ × $6\frac{1}{2}$″.

Rupees 1049-14.

1. Repairs executed to an important channel of irrigation called the "Paukum and Rampaukum Hissa channel" taken off from the Poncyar to supply various villages in the Villapoorem talook.

Rupees 1004-9.

2. Repairs executed to the apron of the Vellar anicut in the Bowengherry talook.

Rupees 2212-15.

3. Cost of a bungalow added to "Government House" in Munjacoopum.

The total amount which appears to have been expended during 1852, on Public works is Rs. 30,343—distributed as follows:—

Works of Irrigation.	Roads Bridges, &c.	Travellers' Bungalows.	Revenue Buildings.	Judicial Buildings.	Flag staff, &c.	Salt Pans.	Govt. House.	Ferry boats.
26,115	1,227	131	136	92	115	266	2,213	49

The amount entered under the head of "Works of Irrigation" appears, with exception of Nos. 1 and 2, items quoted above, to have been expended exclusively on repairs of small extent to tanks bunds and sluices, anicuts, channels, &c. no new works having been executed in 1852. The amount of Rupees 1,227 for "Roads, &c." would seem to have been devoted to trifling repairs to roads in the vicinity of Cuddalore, and the remaining amounts exhibited in the statement speak for themselves. A civil dispensary appears to have been commenced in 1852 at Munjacoopum, but as it was not completed until the following year, its cost [Rupees 3,584] is not included in the statement now submitted.

A general statement of the expenditure on Public works A for the preceding ten years.

2. Enclosure A exhibits the several amounts expended on Public works from 1843 to 1852, inclusive.

3. Statement of collection of Sea Customs during Fusly 1262 A. D. 1852-53.

	Cuddalore.			Porto Novo.		
Exports..	7,221	14	11	8,974	11	6
Imports..	1,725	9	5	2,498	10	7
Totals.	8,947	8	4	11,473	6	1

A general view of the present state of the division in regard to Irrigation, Communications, Ports, Lists of principal works.

4. The remarks offered in my report for 1851 submitted in November last, necessarily apply here as regards the wants and condition of the Province of South Arcot, since the lapse of 3

months cannot have affected its actual position and aspect in an appreciable degree. It would therefore be a waste of time and space to re-capitulate what was expressed under this head in my former memoir, and I will only add that the scope for more attentive observation and inspection, which even that brief period has offered, has tended to confirm and amplify the ideas which I had been led to entertain at the time in question.

5. As I then ventured to remark, it avails little to harp upon what is past and gone, and I therefore take permission to turn in preference to the aspect which the liberal grants of Government and the cordial support of the Board of Revenue have communicated to the affairs of the Province. It will be well perhaps, to enumerate the Estimates which at this time of writing stand sanctioned and the works provided for in which, are either actually in progress or only awaiting the collection of materials to be commenced.

Rupees 66,258.

1. Formation of a new road from the Port of Cuddalore to the frontier of the Salem District. A new line has been sanctioned for this road, and the trace, which is about 68 miles in length, has been cut from end to end. Side channels have been excavated over nearly ⅓ of the track, sites for bridges are selected, gravel and clay are being carted to the portions where they are respectively required and every promise is at present given of the road being open for traffic within 18 months of the present period. I look upon the line as one of paramount importance to [illegible] District, and no personal exertion will be spared to complete it.

2. Bridge and anicut over the Mannemootanuddee near Virdachellum: the site for this has been selected and the plans are to a certain extent prepared, but they cannot be completed or the estimates framed until the necessary levels have been taken to furnish the measurements and establish the irrigating capacity of the channels which the anicut is to fill. I may here quote a proof, amongst many, afforded of the actual pecuniary loss which the public exchequer sustains from the paucity of hands in the Public Works Department. The entire cost of the project may be 50,000 Rupees. If the foundations and basement could be constructed this year and the channels commenced, the whole might be completed before the river comes down next year. The Tahsildar has already collected dependable returns shewing an increase of Revenue to result from the anicut of not less than 18,000 Rupees, and he expects yet to add to that amount. I will assume the annual profit of the

work at Rupees……………………………………………………	20,000
Then deducting interest on 50,000 at 5 per cent…………………	2,500
Leaves an amount of Rupees…	17,500

which will be lost to the State by the almost inevitable postponement of the commencement of the work till next year. The pay of a Surveyor is about 140 Rupees a month, so that the above amount, which might have appeared in the Collector's Returns for 1855, had there been one more surveyor attached to this Division, would have covered the expense of the maintenance of such an officer and have given to the district the great advantage of his services for a period of 10 years. At present I have only one Surveyor available in South Arcot, and though he is under orders to take up the duty adverted to, his health has been so much broken by the hard work which I have been obliged to put him to in lining out roads, &c. &c., that I have been obliged to remit his active employment for a time to avoid the greater evil of his being sent away on sick certificate.

Rupees. 16,914 13 0 — Road from Porto Novo to new Trunk road No. 9.

Much of this road is already lined out and operations are being pressed forward actively.

Rupees 5,000 0 0 — Road from Munjacoopum to Punrooty and Trunk No. 9, by Puttambacum.

This road is considerably advanced in formation, about 9 miles having been well formed, with bridges, &c. completed, but the metalling not applied.

Rupees. 2,000 0 0 — Pile Bridge over the Cundaud river, near yet Marcanum.

Execution deferred under reference to the Board of Revenue in consequence of want of the needful materials.

Rupees.	7,553	12	0	Road from	Marcanum	to Tindevanum,	19 miles.
„	1,269	2	0	do.	Pondicherry	„ do.	21 „
„	5,000	0	0	do.	do.	„ Mylum,	15 „
„	5,543	3	0	do.	do.	„ Villapoorum,	17¼ „
„	3,004	10	0	do.	Tindevanum	„ Thellar,	9¼ „
*Rupees.	1,12,543	8	0				71½ „

The whole of these roads are placed under the controul of the additional Sub-Collector, Mr. Forbes, un-aided by any professional advice beyond that which my occupation allows me to give in laying out and commencing them, and I leave it to judgment whether it is not to be apprehended that, under such circumstances, and considering the multifarious revenue duties which devolve on a Sub-Collector, money must be wasted, errors committed and

---

* This includes the amount of Estimate No. 1, Rs. 66,258.

most valuable time lost. In each of these respects, reckoning under either head, it would be a positive gain to the State to employ at least 3 Overseers, provided they were efficient men, and one Officer to supervise the whole. But then this Officer ought to be a practical man: whether an Engineer or an Officer of the line, he should be practically acquainted with the duty he has to undertake, or confusion, delay and vexation are produced. Yet how is this to be avoided, for where are qualified Officers to be found at the present juncture? Three Officers have recently been attached to this division, but not one of them brings to its aid the advantage of experience, and it is taxing unfairly the resources of a district like this, which languishes for its roads, to make its estimates pay for the instruction of un-professional Assistants—pay not only in money but in all precious time—experimentally operating as it were upon the living subject. It may not be held irrelevant here to remark that an idea would appear to have gone abroad that practical men from England are required to supply the deficiency exhibited by the East India Engineer Department upon which at present devolves the charge and conduct of the Public Works of the interior. This is I think a most fallacious notion. It is precisely the "practice" which the Company's Engineers command, a practice which it takes years to master, and which is in a very small degree dependent on their mental capacity, which makes them more useful to the State than men far their superiors in scientific attainments, but comparatively deficient in local experience and acquaintance. If Engineers from Europe could change the system prevailing in India, could introduce the perfection of workmanship, the intelligence of Subordinates, the vast and ready command of materials, and the excellence in their quality which are ever available where *their* experience was obtained, and could substitute all the refinements of Engineering which modern science has brought into practice in Europe for the primæval methods pursued in India, and necessarily pursued, then indeed the interests of the State would be woefully neglected if a change in their professional administration did not accompany or follow so happy an innovation. But, when it is considered how entirely the reverse of all this is the case, how comparatively barbarous are the means, appliances and materials with which the Indian Engineer has to work, how long it takes to learn to manage the strange class of people who constitute our workmen, to know what amount of operative effect can be elicited from them and the best, perhaps only, way to produce it—to say nothing of the period wasted to the public by sickness and inefficiency during the inevitable trial of probation as to climactic influences, I can scarcely conceive that the position I have quoted in the preceding can be for a moment held tenable. A hundred familiar illustrations of my argument could be cited, but I will content myself with one.

A revetment of brickwork has to be constructed to resist a certain pressure either of earth or water. The principles established for the determination of a masonry Section to resist a given thrust would of course be common to the Indian as to the European Engineer, and the latter would frame his plan in accordance therewith adding the formal excess usual in such cases. But the Indian Engineer would, in 49 cases out of 50, add a great deal more, perhaps double the excess allowed by his contemporary, who would unquestionably condemn the proposal and inhibit it as involving a waste of public money. But that the former would be right, few people acquainted with India would deny, because his "experience" teaches him that the principles brought into operation for the elemental projection of his structure were framed or based upon concomitants which have no existence in the land where his work is planned. He would know that neither materials nor workmanship were good or trustworthy, and that where a Section of 30 might be adequate in Europe, fully 40 would be requisite in India, in the ordinary class of works which it falls to the lot of Indian Engineers to have to project in remote parts of their districts. The reply will be, then improve your materials and operatives, your bricks for example, which are shapeless masses, destroying the efficiency of your wall, mould them to an English pattern and burn them in a proper furnace. The impracticability of carrying out (for many long years at least) such a general improvement as even this solitary instance would produce, is wellknown to practical men in this country; for even if the weary task of overcoming the obstinacy and stupidity of the people is achieved, clever, instructed operatives must be available to shew the native brickmaker how to amend his system, and where, I would ask, are these to be found in any number proportionate to the demand, or where, failing them, is the Engineer to find time to become the instructor! In works of magnitude, such as bridges or anicuts over great rivers, buildings of an important class and the like, different opportunities are presented; but works of this description form but a small integral portion of the vast amount which fall to be planned and executed in remote and unvisited spots in the provinces, and which yet cannot be delayed to wait for improvement and personal supervision, because considerable items of Revenue and of the means of livelihood of the agricultural class depend upon their restoration or establishment.

6. The great want of this division, in common, I conclude, with all the others is educated maistries and intelligent overseers, but the former are so rare that at this moment, when several could be entertained to push forward the road work sanctioned in the Talooks of Tindevanum and Villapoorem alone, and when good pay would be readily given, none are to be heard of; and of the latter class it seems a matter of great difficulty to select men of any pretension to the advancement it leads to. The extreme necessity for the

establishment of schools for the instruction of both descriptions and grades of subordinates becomes every day more apparent, and though the measure recently introduced of entertaining four Apprentices under each Civil Engineer is undoubtedly a good preliminary movement, it is to be feared that the favorable results anticipated from it will be seriously marred owing to the incessant occupation of the Civil Engineers and of their qualified assistants precluding the possiblity of their devoting time to the instruction of these young men without neglecting duties of paramount importance.

7. In addition to the Estimates ennumerated above, many others connected with projects of Irrigation have been prepared, are in course of preparation, or only wait the completion of the necessary channel levels to be finally closed.

8. One for an anicut across the Gingee River near Vicravandy and for a channel to irrigate a considerable extent of land shared between the English and French Governments has been already forwarded (14th January 1854,) to the Collector for consideration and now remains with him.

9. There remain many projects for the improvement of the country and the increase of the revenue which demand investigation, all connected with the subject of irrigation, to which the attention of my successor should be directed. The peculiarity of the rivers which intersect this province and empty themselves into the sea north and south of Cuddalore, as the Gingee, the Mullitar, Poneyar, Guddulum, and Munneemootanuddee is that, unlike the Cauvery, Vellar, and rivers of a higher class, no constant stream of water of any magnitude is retained by them even during the season on which they depend for their supply. After heavy and continued falls of rain they come suddenly down in fresh, roll out to the sea a mighty volume of water and in a few days sink down almost to dryness. To arrest as much as possible of this source of wealth in its wasteful course becomes the point desired, and to this end a few channels have been led from the parent stream on various lines passing through lands susceptible of cultivation, which they irrigate by means of branch channels taken off the main duct. But as the periods of fresh in the river are, as has been observed, very brief and uncertain, it results that to maintain the supply necessary for the cultivation, various difficult and expensive means have to be resorted to, to secure the harvest, extending especially in seasons of drought, to extensive employment of the Pacottah and other appliances for raising water. To provide against this evil tendency it becomes therefore necessary to establish lines of channel in such directions as that by communicating with tanks capable of being enlarged or with positions where the features of the country admit of tanks being formed, the water of the river when in fresh will be received into reservoirs and garnered up for employment

in the season of need. To this end careful explorations of the surrounding country are essentially necessary, to be undertaken of course by experienced men or they will be naturally of but little avail; and I feel assured that when the addition of strength to the Department Public Works admits of such surveys being instituted, results of the most important character will be witnessed, tending to the permanent increase of the revenue, the developement of the resources of the province, and the comfort, happiness and civilization of the people.

South Arcot District,
Coorinjeepady,
22d February, 1854.

J. OUCHTERLONY,
Civil Engineer, 5th Division.

REPORT ON THE PROGRESS OF PUBLIC WORKS IN THE DISTRICT OF SALEM FOR 1852.

The more important works under execution and the amount expended during the year.

1. No work to the extent of 1,000 Rupees appears to have been undertaken in Salem during the year 1852. The Collector draws attention to the excavation of a supplying channel to the Nodevelloor tank in the Ahtoor Talook on an estimate of Rupees 753-0-3 as the most important work under execution during the year.

The bridge over the Cauvery at Bhowany was completed in 52, but I included this work in the report for 51. A statement of incoming and outgoing traffic passing over the bridge compiled from returns prepared in the Collector's Office is appended.

The total amount which appeas to have been expended on public works in Salem during 1852, is Rupees 19,252-15 distributed as follows :—

Works of Irrigation.	Roads, bridges, &c.	Public Buildings.	Revenue Buildings.	Judicial Buildings.	Ferries.
14,174	3,527	394	263	326	569

2. A general statement of expenditure on Public works from 1842 to 1853, together with the amount of disbursements to the Civil Engineer department is also appended.

A general view of the present state of the district in regard to Irrigation, &c. &c.

3. The engrossing nature of the duties falling to be performed in South Arcot has prevented me from giving that attention to Salem which for the interests of that district is imperatively demanded. A steady and systematic exploration of the province, talook by talook, would result I am confident in the permanent establishment of a large increase to its revenue, by means of irrigation produced by ruined tanks to be restored, existing ones to

be enlarged and better supplied by improved channels and anicuts thrown over the jungle streams which feed them, and by a more careful distribution of the surplus waters which now escape during the season of rains without profit to landlord or tenant. I may therefore say that the chief "want" of this district is an Engineer who should be able to devote his whole and undivided attention to its interests, and I feel confident the cost of such a functionary would be repaid to the state ten fold as soon as his projects had come into actual operation. The facilities of transit and export to demanding markets enjoyed more or less all over Salem, and the vast benefit in this respect which the establishment of the railroad will confer on it, all urge the importance of pushing forward projects of irrigation within its limits to the utmost extent practicable. The Cauvery again presents a resource of the highest value in stimulating the industry and energy of the agricultural community of the district, and it is one which appears to me susceptible of greatly extended developement. The chief scheme connected with the application of this great artery of wealth to its legitimate purposes is that long since mooted for the restoration of the ancient anicut at Nerinjepett, but never brought to a decided point of departure until in April 1853, my predecessor in this division submitted an estimate for the repair of its breaches and for the re-excavation of the great channel on the Salem side amounting to Rupees 76,600. Auxiliary works will probably swell this to Rupees 90,000; the return to the State accruing in the form of revenue being estimated at 30,000 Rupees. If however we assume the one at Rupees 100,000, and the latter at only 20,000, it is clear that in a financial point of view the investment would be a most remunerative one. But it is not alone in its direct profitable action on the exchequer that the carrying out of this important project will, it seems safe to say, conduce to the benefit of the Public and the State, the governing and the governed. The tract of country through which the channel passes, and of course for miles outspread around it, has through the abandonment of cultivation which the destruction of the anicut compelled, become utterly wild and waste; dense jungle has clothed it far and wide, and made it the haunt of wild beasts and the refuge of marauders, driving back civilization and arresting the flow of population and improvement, which the records of former days shew to have set strongly upon this portion of the district, under the influence of the enlightened scheme of irrigation in its full and successful operation. The re-establishment therefore of this great work cannot fail at once to restore to it its pristine aspect of prosperity. Vast tracts of land now waste and profitless would be brought under cultivation, not only by the irrigating means of the renewed channel, but in sequence of the measure, which would bring a large rural population to dwell on the soil, and whose industry stimulated by the profit of their wet cultivation would lead them to extend their farms over dry grain levels and over tracts whose produce could be obtained and brought to a profitable market by any means whose economy should place them within their reach. This is indeed but carrying out the principle, maintained by almost universal practice, that agricultural industry crowned at the outset with success and planted on a soil capable of nourishing it, must ever have a forward tendency, and must be ever advancing its sphere of action until the limits of economical access to a consuming market are attained. It is not also to be lost sight of that for at least five months in the year the channel on the Salem side would offer the means of a deep wide canal for the transport of produce from the district adverted to up to the very margin of the Madras and west coast Railway, abutting on it probably a few miles below, or South west of the town of Sankerry, and it will become matter for calculation whether it will not be found remunerative to keep the water of the main channel at a navigable level during several months longer of each year by the employment of mechanical power. I conclude the locomotives of the Railway will be adapted for the consumption of wood in their furnaces, like those of America, and in this case the requirements of the association will be so considerable as to give employment to great numbers of the working class in cutting billets, the constant demand for which would call for the maintenance of water communication for their transport as indispensable to the interests of the people and to the supply of the Railway within the limits of reasonable economy. The jungly tracts above Nerinjepett on both sides of the Cauvery will produce an abundant supply of the necessary material, and as the length of the channel prolonged to the Railway will not probably exceed 25 miles, my impression is that calculation will shew that the interests of all parties will be advanced by its agency; that of the people by the benefits resulting to them from the establishment of any new source and means by which profitable and congenial employment is presented to them, that of the Railway association by its furnishing a channel of supply for bringing fuel and material to their magazines, and merchandize to their rails, and that of the State by the advantages conferred by it upon both, by the advancement of civilization within its territories, and of prosperity and industry amongst its people, and by the encouragement of legitimate enterprize and social progress.

South Arcot District,
Tiroochettumpolliem,
3d *March* 1854.

J. OUCHTERLONY,
Civil Engineer, 5th Division.

Memorandum shewing the Annual Collections of Sea Customs on Exports and Imports at the Ports of Cuddalore, Porto Novo and Murkanum.

Fuslies.	Cuddalore.			Porto Novo.			Murkanum.			Total Customs.		
	On Exports.	On Imports.	Total.	On Exports.	On Imports.	Total.	On Exports.	On Imports.	Total.	On Exports.	On Imports.	Total.
1252	1,146 7 3	4,382 13 10	5,529 5 1	2,550 8 6	3,592 4 2	6,142 12 8	......	......	......	3,696 15 9	7,975 2 0	11,672 1 9
1253	923 1 1	4,894 12 5	5,817 13 6	1,580 3 9	3,833 4 0	5,413 7 9	......	......	......	2,503 4 10	8,728 0 5	11,231 5 3
1254	20,987 11 6	8,023 7 2	29,011 2 8	3,321 12 3	3,356 11 10	6,678 8 1	......	......	......	24,309 7 9	11,380 3 0	35,689 10 9
1255	37,329 14 1	7,288 6 10	44,618 4 11	4,721 5 11	2,208 10 5	6,930 0 4	68 8 0	......	68 8 0	42,119 12 0	9,497 1 3	51,616 13 3
1256	50,426 5 1	6,326 12 1	56,753 1 2	3,165 8 9	2,885 15 5	6,051 8 2	61 8 11	49 4 2	110 13 1	53,653 6 9	9,261 15 8	62,915 6 5
1257	25,708 8 3	6,253 9 11	31,962 2 2	4,729 3 1	3,639 2 0	8,368 5 1	1 10 7	......	1 10 7	30,439 5 11	9,892 11 11	40,332 1 10
1258	10,435 8 9	4,390 13 3	14,826 6 0	6,994 1 7	3,090 4 5	10,084 6 0	7 8 0	......	[illegible] 8 0	17,437 2 4	7,481 1 8	24,918 4 0
1259	13,421 0 0	2,588 12 4	16,009 12 4	4,842 4 1	3,886 2 6	8,728 6 7	9 6 6	......	[illegible] 6 6	18,272 10 7	6,474 14 10	24,747 9 5
1260	20,216 9 2	3,161 15 9	23,378 8 11	4,256 4 1	3,435 2 10	7,691 6 11	......	......	[illegible]	24,472 13 3	6,597 2 7	31,069 15 10
1261	14,067 14 4	2,701 0 0	16,768 14 4	7,795 0 5	4,438 15 0	12,233 15 5	......	......	[illegible]	21,862 14 9	7,139 15 0	29,002 13 9
Total......	1,94,662 15 6	50,012 7 7	2,44,675 7 1	43,956 4 5	34,366 8 7	78,322 13 0	148 10 0	49 4 2	[illegible] 2	2,38,767 13 11	84,428 4 4	3,23,196 2 3

South Arcot, Collector's Cutcherry,
Cuddalore, *5th November*, 1853.

(A true Copy.)

J. OUCHTERLONY,

Civil Engineer, 5th Divis[illegible]

Excepted per

(Signed) E. MALTBY,

Collector.

List of works performed either wholly on in part in the year 1852, *in the* 11 *Talooks to the amount of Rupees* 1,000 *and upwards in South Arcot.*

Names of works.	Amount of Estimate.			Works performed.									Balance of the Estimate.			Remarks.
				Amount of work performed during the year 1851.			Amount of work performed during the year 1852.			Total amount up to the end of the year.						
VILLAPOORUM. *Ordinary.*																
Repairing sluice and clearing the Paukum, &c. Hissa channel....	1,304	7	1	....	...	...	1,049	14	4	1,049	14	4	254	8	9	These repairs are only intended to maintain the ordinary Revenue and expected to be completed in the course of the present year.
BOWENGHERRY. *Emergent.*																
Repairing rough and cut stone Aprons, &c. of the Vellaur Annicut	1,086	1	6	....	...	...	1,004	9	7	1,004	9	7	81	7	11	Completed.
CUDDALORE. *Occasional.*																
Constructing a Bungalow in Government House	2,225	15	5	....	...	...	2,212	15	4	2,212	15	4	13	0	1	Do.
Building a Civil Dispensary in the limits of Munjacoopum	3,665	12	0	....	...	...	3,584	1	0	3,584	1	0	81	11	0	Completed in 1853.

South Arcot, Collector's Cutcherry, Cuddalore,
5th November 1853.

Errors Excepted per

(Signed) E. MALTBY,
Collector.

(A true Copy.)
J. OUCHTERLONY,
Civil Engineer, 5th Division.

Return of Traffic from the Southward passing over the Cavery Bridge at Comarapolliem in District.

Date.	Men women and children.		Horses.		Elephants.		Camels.		Buffaloes bullocks and cows.		Donkeys.		Carts.		Two and four wheeled conveyances.	Goats and Sheep.	Remarks.
	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.			
1st January 1853.	2	810	3	7	...	...	...	...	24	57	5	2	7	4	......		For the week between 1st and 7th January, 1853.
2d " "	5	747	2	1	...	...	...	...	87	14	0	1	1	9	......		
3d " "	8	653	7	6	...	...	...	...	8	133	3	1	31	1	......		
4th " "	3	820	2	1	...	...	...	...	38	214	43	1	4	2	......		
5th " "	11	999	1	1	...	...	...	...	131	19	39	7	61	5	......		
6th " "	3	800	5	1	...	...	...	...	30	25	5	3	31	2	......		
7th " "	32	1,722	2	0	...	3	...	...	19	22	4	3	21	17	......		
Total..	64	6,551	22	17	...	3	...	...	337	484	99	18	156	40	......		
1st April 1853.	767	2,219	3	6	...	...	...	...	165	94	0	0	19	8	......		For the week between 1st and 7th April, 1853.
2d " "	1,263	1,786	4	2	...	...	...	...	107	75	0	8	21	6	......		
3d " "	296	419	5	1	...	...	...	...	25	10	3	2	50	5	......		
4th " "	132	627	1	3	...	...	...	...	23	19	0	2	48	15	......		
5th " "	65	738	1	2	...	...	...	...	37	6	0	1	16	1	......		
6th " "	217	613	4	0	...	...	...	...	45	3	0	0	6	1	......		
7th " "	223	848	3	0	...	...	...	...	59	12	0	0	13	2	......		
Total.	2,963	7,250	21	14	...	...	...	...	461	219	3	13	173	38	......		
24th Sept. 1853.	39	878	5	8	...	...	...	...	53	22	13	9	55	20	......		For the week between 24th & 30th September, 1853.
25th " "	63	1,021	0	5	...	...	...	...	35	58	5	3	15	14	......		
26th " "	79	1,204	0	19	...	...	...	...	84	102	0	3	34	41	......		
27th " "	115	1,073	2	9	...	...	...	...	47	192	0	2	34	23	1		
28th " "	472	357	2	0	...	...	...	...	41	9	7	3	19	71	......		
29th " "	235	756	36	7	...	...	...	...	36	18	0	2	18	27	1		
30th " "	275	1,630	4	2	...	...	...	...	27	13	6	3	12	7	......		
Total..	1,278	6,919	49	50	...	...	...	...	323	414	31	25	187	143	2		
1st Nov. 1853.	125	1,025	2	1	...	...	...	...	125	139	0	6	82	14	......		For the week between 1st and 7th November, 1853.
2d " "	203	658	1	0	...	...	...	...	99	48	6	0	140	11	......		
3d " "	137	1,083	1	1	...	...	...	...	84	16	2	0	47	3	......		
4th " "	126	1,681	8	0	...	...	...	...	32	18	0	0	36	1	......		
5th " "	209	1,783	6	0	...	...	...	...	117	22	9	4	149	9	......		
6th " "	149	865	14	1	...	...	...	...	89	5	6	2	64	2	......		
7th " "	135	915	5	3	...	...	...	...	66	0	3	2	31	0	......		
Total..	1,084	8,010	37	6	...	...	...	...	612	248	26	14	549	40	......		
Grand Total..	5,389	28,730	129	87	...	3	...	...	1,733	1,365	159	70	1,065	261	2		

Statement shewing the number of works inspected by the Officers of the Civil Engineer's Department 5th Division and the manner of their employment during the year 1852, in the Districts of Salem and South Arcot.

No.	Names of Officers.	Rank.	Salem District.													South Arcot District.													Total works inspected in both Districts.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October	November.	December.	Total.	January.	February	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	
1	Captain T. Smythe,.........	Civil Engineer....................	24	17	9	28	...	2	...	4	...	...	...	2	86	...	...	...	...	...	...	...	...	27	19	60	13	119	205
1	Lieutenant Gahagan,........	Assistant Civil Engineer.........	...	...	...	...	...	...	1	1	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2
1	Mr. H. O'Hara,................	Assistant Surveyor................	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	Mr. H. Vardon, ...	" "	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	8	1	...	...	...	...	...	...	...	...	11
1	Mr. J. Loosemore,............	Assistant Overseer................	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
1	Mr. D. Kennedy,.....	" "	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..
6			24	17	9	28	...	2	1	5	...	...	...	2	88	...	...	2	8	2	...	...	...	27	19	60	13	119	219

Names of Officers.	How employed during the year.
Captain Smythe.	January to April.—Inspecting works, and for a third of the latter month tracing Ghaut Road from Sherveroy Hills to Dharampoory. May to August.—Tracing Ghaut Road to Dharampoory, September to December inspecting works.
Lieutenant Gahagan, ...	Joined the Division in March and superintending construction of Parapetts, &c. to the Cavery Bridge up to July, August, superintending construction of Salem new Travellers' Bungalow and assisting in the trace of the Ghaut Road, to September 21st, accompanying the Civil Engineer in a tour of inspection, and afterwards removed from the Division.
Mr. O'Hara,........................	January to December.—Sherveroy Hill Survey, excepting August, during which month he was on leave.
Mr. Vardon,........................	January and February.—Chiefly preparing plans and estimates for the Salem and Cuddalore road, March and April, inspecting works. May and June, superintending repairs to Vellar Anicut and the construction of the Cuddalore Civil Dispensary and Ponnear Vaghany—July to October, Civil Dispensary and Ponnear Vaghany works, November, Dispensary work and making a survey of the Guddelum, Oopenaur and Ponnear rivers, December, survey of the 3 rivers.
Mr. Loosemore, ...	January.—Cuddalore Dispensary work and survey of Cuddalore Backwater. February to April, Dispensary work, part of April, sick—May, partly sick and partly superintending Dispensary work. June to December sick.
Mr. Kennedy, ...	Joined division in November and studying duties of the department in the Civil Engineer's Camp until December.

J. OUCHTERLONY,
Civil Engineer, 5th Division.

Memorandum shewing the Annual Collections of Sea Customs on Exports and Imports, at the Ports of Cuddalore, Porto Novo and Murkanum.

Fuslies.	Cuddalore.			Porto Novo.			Murkanum.			Total Customs.		
	On Exports.	On Imports.	Total.	On Exports.	On Imports.	Total	On Exports.	On Imports.	Total.	On Exports.	On Imports.	Total.
1252	1,146 7 3	4,382 13 10	5,529 5 1	2,550 8 6	3,592 4 2	6,142 12 8	......	......	......	3,696 15 9	7,975 2 0	11,672 1 9
1253	923 1 1	4,894 12 5	5,817 13 6	1,580 3 9	3,833 4 0	5,413 7 9	......	......	......	2,503 4 10	8,728 0 5	11,231 5 3
1254	20,987 11 6	8,023 7 2	29,011 2 8	3,321 12 3	3,356 11 10	6,678 8 [illegible]	......	......	......	24,309 7 9	11,380 3 0	35,689 10 9
1255	37,329 14 1	7,288 6 10	44,618 4 11	4,721 5 11	2,208 10 5	6,930 0 4	68 8 0	......	68 8 0	42,119 12 0	9,497 1 3	51,616 13 3
1256	50,426 5 1	6,326 12 1	56,753 1 2	3,165 8 9	2,885 15 5	6,051 8 [illegible]	61 8 11	49 4 2	110 13 1	53,653 6 9	9,261 15 8	62,915 6 5
1257	25,708 8 3	6,253 9 11	31,962 2 2	4,729 3 1	3,639 2 0	8,368 5 [illegible]	1 10 7	......	1 10 7	30,439 5 11	9,892 11 11	40,332 1 10
1258	10,435 8 9	4,390 13 3	14,826 6 0	6,994 1 7	3,090 4 5	10,084 6 [illegible]	7 8 0	......	7 8 0	17,437 2 4	7,481 1 8	24,918 4 0
1259	13,421 0 0	2,588 12 4	16,009 12 4	4,842 4 1	3,886 2 6	8,728 6 [illegible]	9 6 6	......	9 6 6	18,272 10 7	6,474 14 10	24,747 9 5
1260	20,216 9 2	3,161 15 9	23,378 8 11	4,256 4 1	3,435 2 10	7,691 6 1[illegible]	......	......	......	21,472 13 3	6,597 2 7	31,069 5 10
1261	14,067 14 4	2,701 0 0	16,768 14 4	7,795 0 5	4,438 15 0	12,233 15 [illegible]	......	......	......	21,832 14 9	7,139 15 0	29,002 13 9
Total......	194,662 15 6	50,012 7 7	2,44,675 7 1	43,956 4 5	34,366 8 7	78,322 13 [illegible]	148 10 0	49 4 2	197 14 2	2,38,767 13 11	84,428 4 4	3,23,196 2 3

South Arcot,
Collector's Cutcherry,
Cuddalore,
5th November, 1853.

(A True Copy.)

J. OUCHTERLONY,
Civil Eng 5th Division.

E. E. Por

(Signed) E. MALTBY,
Collector.

Return of Traffic from the Northward passing over the Cavery Bridge at Comarapolliem in the Salem District.

Date.	Men women and children.		Horses.		Elephants.		Camels.		Bullocks and cows.		Donkeys.		Carts.		Two and four wheeled conveyances.	Goats and Sheep.	Pigs.	Remarks.
	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Laden.	Unladen.	Eaden.	Unladen.	Laden.	Unladen.				
1st January 1853.	1	607	5	6	...	...	..	...	13	62	0	2	3	3	......	5	1	For the week between 1st and 7th January, 1853.
2d " "		748	1	2	...	...	...	...	35	14	0	0	1	1	......	1	2	
3d " "		957	4	9	...	...	...	...	237	15	0	2	26	1	......	2	4	
4th " "		1,139	0	1	...	...	...	...	18	17	44	7	3	1	......	3	0	
5th " "		1,350	2	1	...	...	...	...	9	110	47	11	11	3	......	2	0	
6th " "	1	1,168	2	2	...	...	...	...	37	14	3	0	11	5	......	9	1	
7th " "	2	1,487	3	2	...	...	...	...	11	23	7	0	13	1	......	143	2	
Total..	6	7,457	17	23	...	...	...	...	360	255	101	22	68	15	......	165	10	
1st April 1853.	6	1,020	0	0	...	...	...	...	341	134	......	6	16	2	......	......	...	For the week between 1st and 7th April, 1853.
2d " "	3	666	7	2	...	...	...	...	44	70	......	......	74	34	......	......	...	
3d " "	2	473	0	1	...	...	...	...	20	5	......	......	59	3	......	......	...	
4th " "	2	753	9	1	...	...	...	...	34	4	......	......	36	9	......	21	...	
5th " "	1	789	4	1	...	...	...	...	58	206	......	......	27	11	......	......	...	
6th " "	1	648	5	2	...	...	...	...	39	10	......	......	18	3	......	......	...	
7th " "	2	768	5	0	...	...	...	...	90	15	......	......	8	3	......	4	...	
Total.	2,0	5,117	30	7	...	...	...	...	626	444	......	6	238	65	......	25	...	
24th Sept. 1853.		723	3	4	...	...	...	...	17	7	23	13	13	3	......	7	0	For the week between 24th & 30th September, 1853.
25th " "		1,072	0	2	...	...	...	...	13	4	7	2	17	3	......	0	3	
26th " "		1,121	14	2	...	...	...	...	61	56	33	0	23	11	......	6	2	
27th " "		973	11	9	...	...	...	...	74	74	0	0	30	35	......	17	0	
28th " "	3	456	2	1	...	...	...	...	33	38	0	2	49	2	......	3	11	
29th " "	1	889	1	2	...	...	...	...	14	22	2	0	13	6	......	2	2	
30th " "	2	1,072	1	4	...	...	...	...	104	52	0	43	24	2	2	1	0	
Total..		6,306	32	24	...	...	...	...	316	253	65	60	169	62	2	36	18	
1st Nov. 1853.		930	9	3	...	...	...	...	79	20	0	9	77	8	......	18	9	For the week between 1st and 7th November, 1853.
2d " "		1,053	2	1	...	...	...	...	55	14	5	2	109	8	......	3	0	
3d " "		945	3	2	...	...	...	...	61	31	2	5	52	2	......	2	2	
4th " "		1,009	5	8	...	...	...	...	69	44	0	0	39	6	......	0	1	
5th " "		1,220	8	0	...	..	...	...	94	26	5	4	43	3	......	0	1	
6th " "		713	2	0	...	...	...	...	130	30	10	0	68	2	......	9	0	
7th " "		201	7	5	...	...	...	...	147	28	6	3	16	0	......	12	0	
Total..	1	6,071	36	19	...	..	...	...	635	193	28	23	404	29	......	44	13	

REPORT ON IMPORTANT WORKS EXECUTED IN THE SIXTH DIVISION IN 1852.

TANJORE DISTRICT.

Only two works of considerable amount were executed in this year, and their object was less for the extension of irrigation, than for the preservation of the sources of revenue by the improvement of existing works.

PAUPANASSUM TALOOK.

Improving the Vuddavaur River.

Estimate............Rupees	...9,364	0	0
Expenditure ...... "	...8,713	1	0

This project is thus described in my letter to the Collector of Tanjore dated 14th October 1851. "The Vuddavaur branches from the Vennaur near Peramboor about eight miles westward of Tanjore, and flows on a high level to its termination in the Vuddavoor Tank, receiving in its course the discharge of numerous jungle streams. It is not supplied by means of an annicut, nor regulated by a head sluice, and for many years past its due share of water has been obtained with difficulty and only when the stream of the Vennaur has been abundant. It has long been evident to me that some effectual and decided change must be made in the head of the river, and the necessity was quite apparent about three weeks ago, when the supply entirely failed."

"About 2½ miles above the head of the Vuddavaur, a large channel from the Vennaur, called the Peramboor channel, has its source, and affords a supply to 170 vaylies (1020 acres) of land, which is much less than with some improvement it is capable of irrigating. By connecting this channel with the Vuddavaur, and giving a branch to its separate tract of cultivation, a command of six feet will be at once obtained for the more important river, and an abundant supply of water for both will be ensured. The Peramboor channel requires to be straightened and embanked. The Vennaur also needs embankment, and the Vuddavaur most urgently demands improvement, by cutting numerous sharp bends in its course. The immediate object of the proposed outlay is the security of the public revenue, and the prevention of losses by the ryots on account of failure in the irrigation, but that the works will lead to a great increase of cultivation and revenue is certain."

The works were efficiently executed, and as far as is yet known, have unquestionably fulfilled their immediate purpose of securing the cultivation which is also in course of gradual extension in proportion to the means of the landholders. The average revenue yielded by the Vuddavaur is about 28,000 Rupees.

The following is a list of the principal works performed in addition to the above consisting exclusively of ordinary repairs or improvements not calling for separate notice.

Talooks.	Work.	Amount of Estimate.			Amount of Expenditure.		
Munargoody.	Widening and deepening the Coolyaur river	1430	11	0	1265	3	0
	Do. do. the Agamalanaur river.	1613	6	0	1171	5	0
	Improving the Tiroomany channel	2833	0	0	2812	5	0
	Widening and deepening the Pandavyaur river	1136	4	0	1119	15	0
Codawassel.	Repairing the Chelloor annicut	5256	8	0	3402	10	0
Cootailum.	Raising and sanding road along the south bank of the Veerasholen river from Auditoray to Coilachairy Calingulah	1073	13	0	637	14	0
	Raising and strengthening the Coleroon south bank	1842	10	0	1652	3	0
Combaconum.	Cutting channel and removing island in the bed of the Coleroon	1235	5	0	1103	11	0
Sheally.	Embanking the Coleroon on the south side from the high road to Mahandrapully...	5158	10	0	4707	6	0
	Cutting side of the Coleroon in the limits of Mahandrapully	2109	6	0	2071	14	0
	Raising and strengthening the Coleroon bank from Panangattangoody to Mailvellum	1358	4	0	1284	7	0
	Improving and strengthening the bank of the Oopenaur from Rettacolum to Paloyapolium	4027	0	0	3798	13	0
	Strengthening the banks of the Munnyaur river	1416	0	0	1394	0	0
	Enlarging the Caukyaur bridge on the road from Sheally to Tranquebar	1366	4	0	1119	1	0
Parellum.	Deepening and widening the Vellayaur river	1108	5	0	267	11	0
Velungamaun.	Cutting new head of the Poolavennaur river and closing breaches	1791	10	0	1183	1	0
Nunnellum.	Altering the bridge over the Moodecondaun river on the road from Myaveram to Trivatoor	1498	0	0	1227	6	0
Trivady.	Repairing the regulating dams at the head of Vennaur	2874	10	0	1487	1	0
	Repairing the upper Coleroon annicut......	1216	0	0	1168	0	0

The total maramut expenditure in Tanjore was as follows viz.

Irrigation and Drainage..........	Rupees...	1,83,622	7	0
Road and Bridges............	„ ...	5,458	3	0
Navigation, Sea Ports, &c......	„ ...	4,112	0	0
	Total Rupees...	1,93,192	10	0

TRICHINOPOLY DISTRICT.

No new work of considerable extent or importance in the irrigation department was executed in this district during the year, but repairs and improvements are fully attended to, as the following list will shew.

VITTICUTTY TALOOK.

Repairing bank of Jungle stream in the limits of Comaramungalum.

Estimate..........	Rupees...	1,001	15	0
Expenditure......	„ ...	948	9	0

This was designed for the protection of the irrigated lands from the inundations of a torrent which flows from the high land in the vicinity.

Altering the head of Kristnarayapooram Channel.

Estimate...........	Rupees...	2,776	8	0
Expenditure.......	„ ...	2,649	5	0

The head of the channel having been encroached upon by the Cauvery, a new one was cut from a higher point on the river.

Repairing the old head of the Nungaveram Channel.

Estimate...........	Rupees...	1,291	11	0
Expenditure.......	„ ...	1,290	0	0

The former head of this channel had been abandoned owing to its being filled with sand, and this work was intended for clearing and restoring it.

Improving the Cutlay Naut Voikal and rebuilding two aqueducts and a bridge across it.

Estimate...........	Rupees...	1,130	7	0
Expenditure.......	„ ...	1,116	9	0

General repairs and improvement of works for the free flow of the water to the cultivation.

Extending Coorchy Jungle stream.

Estimate...........	Rupees...	2,428	2	0
Expenditure.......	„ ...	895	11	0

Intended to turn the course of a torrent which crosses irrigated land, and give it a new outfall at a lower point, to relieve the land from floods.

Moosery Talook.

Repairing the head of Cautpootoor and Iyelloor channel and removing an island in the Cauvery.

Estimate.........Rupees...4,000 0 0
Expenditure....... „ ...3,605 5 0

This important channel suffered very much from the formation of islands in the river by which a deep current was thrown across it, and the head was filled with sand. The removal of the principal island by a deep cut through it, was successfully accomplished, and the level of the river bed has been restored. One fourth of the cost of the work was defrayed by the Mootahdar of Cautpootoor.

Laulgoody Talook.

Repairing the Coleroon bank in the Limits of Mailumbel.

Estimate..........Rupees...1,300 1 0
Expenditure...... „ ...1,156 14 0

A work of ordinary repair.

Repairing the bank of Peravully channel.

Estimate..........Rupees...1,444 4 0
Expenditure...... „ ...1,320 9 0

A work of ordinary repair.

Improving the Coleroon bed between Putchampettah and Treplatoray.

Estimate..........Rupees...1,330 15 0
Expenditure...... „ ...1,315 6 0

This outlay took place in an unsuccessful attempt to remove a vast accumulation of sand by which the stream was turned with great force against the banks. Some improvement was effected, but not nearly to the extent anticipated, as the wind filled up the cut with drift sand before the current could widen it.

Deepening and widening the North Iyen channel from Laulgoody to Cadoovoy.

Estimate..........Rupees...1,112 6 0
Expenditure...... „ ...1,105 9 0

A work of ordinary repair.

Extending Teroomungalum Anicut.

Estimate..........Rupees...9,556 6 0
Expenditure...... „ ...6,850 7 0

The expenditure was sanctioned for giving increased waterway to a very important annicut carrying the Pungoony channel across the Oopaur river. It was very efficiently executed.

Constructing Head Sluice to Pitchandercoil channel.

Estimate..........	Rupees...	1,264	3	0
Expenditure......	„	...1,264	3	0

A minor project for giving several branch channels of the Iyen Voikal a common supply on a higher level which succeeded perfectly.

Repairing Veeragaloor Tank bank.

Estimate..........	Rupees...	3,327	2	0
Expenditure......	„	...3,202	0	0

The object of this work was to strengthen the bank sufficiently to enable it to hold a larger supply, and to extend its irrigation.

Repairing the Banks of Pungoony channel.

Estimate..........	Rupees...	1,613	2	0
Expenditure......	„	... 114	1	0

A work of ordinary repair.

TORRIOOR TALOOK.

Repairing Mooroongacalatoor Tank bank.

Estimate..........	Rupees...	1,984	7	0
Expenditure......	„	...1,669	6	0

A work of ordinary repair.

ROADS AND BRIDGES.

Conaud and Vitticutty talooks, repairing the road from Trichinopoly towards Coimbatore.

Estimate..........	Rupees...	6,905	0	0
Expenditure......	„	...3,827	10	0

This work included general repairs extending over a distance of 40 miles, only part of which was executed in the year under review.

LAULGOODY TALOOK.

Constructing the road from Trichinopoly to Salem between the Coleroon Bridge and that of the Iyaur.

Estimate..........	Rupees...	4,800	0	0
Expenditure......	„	...3,603	4	0

This work consisted of a complete formation of new road in alluvial soil for a distance of 9 miles, but was only performed in part.

Constructing a Bridge of five arches of 30 feet span across the Iyaur on the above Road.

Estimate	Rupees	6,947	4	0
Expenditure	„	3,805	12	0

The piers of the bridge were built in the year under review.

Repairing the road from Trichinopoly to Combaconum between the former Town and the Grand Anicut.

Estimate	Rupees	5,042	1	0
Expenditure	„	2,749	10	0

This important road for a distance of 10 miles was greatly out of order, and the estimate provided for its efficient repair, which was partially executed.

The aggregate expenditure in Trichinopoly was as follows.

Irrigation	Rupees	72,353	3	6
Roads and Bridges.	„	612	7	3
Navigation, &c.	„	1,313	10	4
	Total Rupees	74,279	5	1

SOUTH ARCOT DISTRICT.

Irrigation Works.

Munnargoody Talook.

Constructing the Rajah Voikal, head sluice.

Estimate	Rupees	5,996	14	0
Expenditure	„	5,196	1	0

This work was built close to the lower Coleroon anicut, and was designed both as a sluice and bridge for the trunk road, No. 9. It was constructed in a very efficient manner.

CHELLUMBRUM TALOOK.

Closing the entrance of the old course of the Coleroon in the limits of Trekalapaly and widening the new course.

Estimate	Rupees.	2,145	4	0
Expenditure	„	1,544	12	0

The object of this work was to confine the river to one channel and prevent breaches in the banks, and it succeeded.

Cutting Island, planting, &c. in the Coleroon in the limits of Vullatoray.

Estimate	Rupees.	1,068	0	0
Expenditure	„	1,002	13	0

This also was intended for rectifying the course of the river Coleroon.

Strengthening the banks of the Khan Sahib's Channel.

Estimate	Rupees	1,600	3	0
Expenditure	„	1,351	13	0

A work of ordinary repair.

Strengthening the banks of the Coleroon.

Estimate	Rupees	4,594	0	0
Expenditure	„	3,644	5	0

General repairs of the North bank of the River.

NAVIGATION WORK.

Manargoody Talook.

Clearing out the Vellical Channel.

Estimate	Rupees	1,534	12	0
Expenditure	„	1,045	2	0

A work of ordinary repair.

The total amount expended in the two Southern Talooks of South Arcot, was as follows:

Irrigation	Rupees	31,507	3	2
Roads and Bridges	„	717	3	2
Navigation, Sea Ports, &c.	„	50	12	7
Total	Rupees	32,275	2	11

General Remarks.

In reporting on the state of the division under my charge, I must confine myself to a notice of the principal objects of attention during the last ten years, and their general results, since it is impossible to obtain detailed accounts without seriously encroaching on the current duties of the Revenue Department.

Since 1842 the principal works in Tanjore have been designed chiefly with a view to control and regulate the increased body of water thrown into the province by the upper anicut, which itself greatly extended and improved, has been materially assisted as an escape weir by the dam across the head of the Cauvery.

The dams across the Vennaur and Cauvery at the head of the former, were intended for, and have effected a similar regulation of the river beds at the point of separation. In various instances anicuts and bridges have been enlarged to afford the necessary increase of waterway, but the most important works have been those for the drainage of the lands near the coast, which have been progressively carried on, as far as means have been available for superintendence.

There can be no doubt whatever that the result of all these operations has been to give a stability to the revenue which it never before possessed, and in a corresponding degree to raise the value of landed property. Cultivation has been gradually extended, and the increase would have been much greater, had the means of planning and executing the minor works been adequate. It must not however be supposed that the field of improvement is fully occupied. Regulating bridges should be built at all the river heads ; extensive tracts of land are waiting for irrigation or drainage, and there is water enough in the Cauvery for their supply, provided it is properly controlled ; but the present state of the Engineer Department, and the want of laws adapted to the efficient working of the system on which the public welfare depends, discourage all extended effort for improvement.

Roads and bridges in Tanjore have been considerably increased, but up to the year included in this report, no permanent provision for their maintenance existed. The number of bridges erected during ten years was 33, but the cost of the greater part of these was charged to the surplus Pagoda Funds, and 3 were built at the Rajah's expense. The total want of any hard material for roads in the Delta is a serious obstacle to the improvement of the communications, but it may lead to the earlier adoption of railways in their simplest form.

Inland navigation has made one step in advance by the opening of the Veerasholen river to Tranquebar, but with this exception there was no improvement, and the line connecting the Cauvery with Porto Novo though available, remained in its original imperfect state.

The only sea ports which received any attention were Nagore and Negapatam, and the outlay on these was too small and irregular. It must never be forgotten that harbours formed by the mouths of small rivers require not only improvement, but maintenance, to overcome in due time those natural causes of deterioration which are always in action. A deposit of mud may be more easily removed as soon as formed than after it has become consolidated.

As it would lengthen this report beyond reasonable bounds to dwell on the particular projects which have occupied my attention, I shall merely add that the wants of Tanjore in irrigation, drainage, communications, and harbours, are still far beyond all available means of supply.

In Trichinopoly the chief difficulty for many years had been to maintain the great irrigating channels branching from the Cauvery in an efficient state, and works of considerable extent were required, first to throw in a sufficient body of water, and then to regulate it during heavy floods, when the local rains bring down violent torrents across the line of irrigation. The old native works were ill adapted to this end, and had fallen into disorder, and the attention of this department has been given to their improvement with beneficial results; cultivation has been increased, but chiefly it has been secured, and indeed it has been quite impossible to enter on the wide field for the extension of existing channels, and the construction of new works which offers itself on both sides of the Cauvery, but especially along the left bank of the Coleroon and the right bank of the Vellaur. Repairs of tanks have been efficiently and usefully kept up.

The communications of this district have received considerable attention in the period under review, and indeed only one bridge of any importance had been before built. The construction of bridges across the Cauvery und Coleroon has had a visibly good effect on the condition of the people, evinced by the constant improvement of their dwellings, and the regular trade in building materials which has sprung up near Trichinopoly. The increase of carts and carriages is very marked, and the value of land has decidedly risen.

The wants of this district, next to the reduction and equalization of the land tax, are increased irrigation and improved roads, but neither of these can be properly carried out on the present system, which loads a Native Officer of Revenue and Police with executive responsibilities for which he is unfitted.

The two Talooks of South Arcot annexed to this Division have received as much attention as the means of this Department would permit, and the state of the irrigation and drainage was investigated and ably reported on by my assistant Captain Ludlow. But it may safely be said that the result of all works of irrigation for the ten years prior to 1852 has been merely preservative, for the state of the river Coleroon has been such as to absorb a large share of attention and outlay in the care of its left bank.

Some very useful roads and bridges have been constructed, and the Talooks which were formerly almost impassable for half the year, are beginning to feel the advantage of communications open at all seasons, but no provision for keeping up these works is yet made, and the soil being even worse for traffic than that of Tanjore, the delay in effecting repairs is seriously prejudicial to the interests of Government, as well as to the convenience of trade.

The single canal traversing these Talooks is inefficient, and demands more improvement than there are means of effecting, and its terminus Porto Novo, once an important and flourishing seaport, has long required works which would render it available as a repairing harbour for country vessels.

It is but a repetition to say that the wants of these talooks are improved irrigation, and communications, and a better outlet on the coast.

In reviewing the operations carried on during the period embraced in this report, it is necessary to advert briefly to the means at my disposal for planning, estimating and superintending works, the great majority of which are accessible for only five months annually. It must also be considered that without local knowledge an officer or surveyor is almost useless in the Delta, and that the supervision of the proceedings of unexperienced assistants entails on the Civil Engineer an amount of anxiety and trouble unknown in most other districts. Further it is to be remarked that since 1848 I have acted on my own responsibility as Executive officer of several considerable works, involving an outlay of more than 3 lacs, which necessarily occupied much of my attention.

From 1842 to 1846, I had no assistant, and generally only two surveyors. In 1846, I was joined by Lieutenant Boileau, and in the end of the following year by Lieutenant Bean. The former officer left the division early in 1850 and Lieutenant Bean in 1851, shortly after the arrival of Captain Ludlow, who remained only one year, being succeeded by Lieutenant O'Connell, whose period of service was five months. All of the above named officers were able and zealous in the performance of their duty, but only the two latter had been previously employed in the Irrigation Department, and Captain Ludlow alone had any local experience, so that valuable as were their services, I have never been able to receive from my assistants that aid in planning and carrying out works of importance which I have so greatly needed, while on the other hand their early departure has entailed on me increased labour in superintending their projects thus devolving on myself. The surveyors attached to the division have all, with the exception of Mr. Gaynor, who died in 1851 and Mr. Hazle removed in 1845, been new to its duties since my arrival, and Mr. Potter however able as a Mechanical Engineer was never qualified for general employment.

Of the conduct and ability of the European overseers under me, I cannot speak too highly, and I may safely assert that without their aid many of the works must have remained unexecuted.

Porto Novo,
30th March, 1854.

EDWARD LAWFORD, MAJOR,
Civil Engineer, 6th Division.

REPORT UPON IMPORTANT PUBLIC WORKS IN THE 7TH DIVISION, DURING THE YEAR 1853.

Owing to the absence of the Civil Engineer from the division during the preceding year, no large estimates were made, and consequently, few works of importance, were under execution in the division during the year 1852. I proceed to notice such as appear worthy of remark commencing with the

PROVINCE OF MALABAR.

Civil Dispensary—Calicut.

This building differs from others of a similar class, only in being provided with more ample detached accommodation.

Besides the usual cookrooms, dead house, &c. it has store rooms, and a detached building for the reception of contagious cases, and others requiring separate treatment, a most useful and necessary addition, especially in Malabar.

The buildings are substantially and well finished of laterite in chunam, with tiled roofs properly ventilated. The compound is neatly enclosed, and the arrangement of the privies, is particularly good.

The work has been executed in a highly satisfactory and economical manner. The estimate was Rupees 3,274-10, including 100 Rupees for clearing a well and completing the enclosure.

The expenditure has been Rupees 2,949-11-3; but this does not I believe, include the purchase of the ground, the cost of which I am not informed of.

Compound wall to the Salt golah—Calicut.

Estimate.......	Rupees	259	1	0
Expenditure...	„	262	9	11

A very necessary addition to the salt golah and intended to secure the dealers from peculation, while loading their beasts. An open rail standing on a dwarf wall, has been substituted for the dead wall originally designed, which I consider to be an improvement.

The work has been well executed.

Eranjoly Bridge.

This bridge, spanning a river on one of the main approaches to Tellicherry, consists of a wooden platform, resting on laterite piers and intermediate piles.

It has frequently been out of order, owing partly to the bad quality of the laterite forming the piers, and partly, to the decay of the wood work, and has been put into repair this year at a cost of Rupees 1,546-12-0, but the portion of the work executed by contract, is not done as satisfactorily as could have been wished.

It is worthy of remark, that on examining the piles of this bridge, all of which were, I am informed, driven at the same time, I found the teak ones extensively decayed, whereas, those of Irool were nearly, if not quite sound.

Muttanoor, Cotaparumba and Tellicherry Road.

Estimate ....Rupees 13,773 7 0

Of which 2,328 have been expended during this year.

This is a branch from the Perambaddy Ghaut line, leading to Tellicherry and will when completed, be a most useful road.

The estimate besides many drains and minor bridges, includes a large work acoss the Meramboi, a difficult, and dangerous stream.

The line has been admirably traced, and improved by Captain Francis, and the work is progressing satisfactorily, but as little comparatively has yet been done, especially, to the masonry works, a fuller notice will more properly be included in the report for 1853.

Some alteration in the old line will still be necessary at the north approach to Cotaparumba.

Talook Cutcherry, Cotaukul.

Estimate............	Rupees	1,915	7	0
Expenditure	„	1,915	4	3

A very substantial and neatly finished building, and well adapted to the intended purpose, but hardly executed so economically as might have been expected.

Ponany Groins.

The town of Ponany situated on the south bank of the large river of that name near its mouth, has long been exposed to serious injury from the action of the current during high freshes. A substantial laterite wall built many years ago for its protection, although subsequently repaired, had been gradually undermined and overturned in many places, having entirely failed in its intended object. The danger was becoming yearly more imminent, and it was evident, that if some effectual means were not adopted to stay the mischief, a few years more would see the whole, or a great part of the town carried away.

Major Cotton proposed the construction of groins consisting of lines of piles driven perpendicular to the bank, cased with planks, and having their extremities protected by masses of large rough stones thrown in loosely and allowed to assume their natural slope.

An estimate of Rupees 7,649–10–0 was sanctioned for 2 such constructions, the townspeople agreeing to reimburse Government for their outlay in the event of the works having the desired effect.

The lines of piles were driven and the whole of the wood work, including short piles and struts for lateral support, finished, prior to the monsoon of 1852 and although the arrangements could not be completed for the rough stone defences, it was anticipated that the works as they stood would suffice to resist the action of the stream during one monsoon.

Such however did not prove to be the case, for although when I inspected the works in the beginning of June, they had sustained undamaged a pretty high fresh, the subsequent floods which were of unusual volume, undermined the end of the groins, and seriously damaged both of them.

Had longer piles and of a better material than cocoanut wood been used, and had a more efficient pile driver been available, this accident would probably not have occurred. The actual loss however was not great, probably not exceeding 700 Rupees. The damages were repaired after the monsoon, and the works have since been fully completed, and have thoroughly answered every expectation which was formed of them. Of the operations in 1853, a full account will be furnished by Captain Selby the Officer who directed the repair and completion of the works in the report for that year; I may however observe here that imperfect as was the state of the groins during the very severe freshes of 1852, they still served most effectually to protect the Town, which sustained no damage whatever.

New line of Trunk Road No. 5 by Perlay.

Paulghaut is situated on a sort of Peninsula formed by the Kulpathee and Kunnady rivers, which unite a little lower down forming the Ponany river.

The old line of road crossed first the Kunnady river and afterwards the Ponany river below the point of junction.

The new line by taking a more northerly direction, has simply to cross the Kulpathee river above the point of junction, and the passage of the second and larger stream is altogether avoided. The road moreover though a trifle longer passes over a far more favorable country.

For the bridge across the Kulpathee or Perlay river a sum of Rupees 12,990-1-6 was sanctioned, and with the exception of the parapets and roadway the work was completed under the direction of Mr. Robinson; but subsequently to that gentleman's departure the work seems to have languished, for it was not fully finished until 1853.

For the alteration of the line of road a sum of Rupees 13,066-10-4 was sanctioned including Rupees 1,538-15-0 for a bridge of one 30 foot arch, Rupees 902-7-2 for another of one 18 foot arch and Rupees 5,622-5-0 for 39 tunnels of various sizes.

The bridges and many of the tunnels were built by the end of 1852 and the road itself had made good progress, the whole sum expended during the year being Rupees 6,615.

The work as far as it is completed is highly satisfactory, and the road will when finished, which it should be with proper exertion in 1853, be a first rate one.

This new line between Paulghaut and Perlay together with the Perlay bridge, have the additional advantage of opening up, so far, a first rate line of communication between Paulghaut and Manaur viâ Mundoor. The continuation of the line to Mundoor is now in progress, and I trust to be able shortly to report similarly of the portion between Mundoor and Manaur.

Road from Pooraparamba to Betutpoodiangady.

Of a sum of Rupees 3,483–4½ sanctioned for metalling and improving portions of this line 1,165 Rupees were expended previous to, and Rupees 2,678–4½ during the year now under review.

The whole sum sanctioned has then been expended, and the repairs as far as they have been executed have materially improved the line. Nevertheless much still remains to be done, and several portions which were omitted in the Estimate, whether from oversight or from their state then being better than it is now, will have to be similarly improved.

Several Tunnels are required, and the road in parts needs raising and in others widening.

Road from Perpanangaudy to Tirovungaudy.

Of an estimate of Rupees 497-6-0 sanctioned for the improvement of this road, 326 Rupees were expended in 1852, and the balance subsequently.

It is a road, practicable for wheels, branching from the main coast line and terminating, as a bandy road, at Terroovungaudy an important Cusbah town, from which cattle roads lead to Malapoorum, Angadypoorum, Cherpulcherry and other places.

The monsoon of 1853 had again cut up the line a good deal, and I deemed it necessary to frame a further estimate for the improvement of this important branch.

Repairing and improving the road and Building Tunnels and Bridges between Cherpelcherry and Vaniancollum.

Estimate Rupees 2,070-14-0. The expenditure having been Rupees 1,046 prior to 1852 and Rupees 1,140 in that year, there has consequently been an excess of Rupees 133-2-0.

The improvement of this road has rendered it better than the main one from which it branches. It is a good cart road throughout, and is a judiciously selected and well executed little line.

The estimate included 3 small bridges and drains, and a large platform bridge of 2 vents across the Pattiancollum stream.

This latter work when first built failed, owing to insufficient thickness of abutment and the bad quality of the material used. It was subsequently rebuilt at the expense of the parties whose negligence had caused the accident, and it is now in good order.

The whole road and works connected with it with the above exception have been executed in a highly creditable manner.

Coondon Jodu Channel.

Betutnad Talook.

An estimate of Rupees 627-13-0 was sanctioned by Government in 1851 for the excavation of this channel, the object of which was twofold, 1st the drainage of certain Poonjay lands situated in the bed of the Venjalee Lake during seasons of flood, and 2d, the conveyance of water from the same lake to the lands in question at other times.

The estimate framed by the maistry, was found when the work was carried out to be deficient both as to the quantity of excavation and rates.

Owing to inadequate depth of excavation the water did not find its way to the upper part of the channel, and it had to be deepened subsequently and now answers the intended purpose.

The cost of the work has exceeded the estimate by 350 Rupees, but of this 239 Rupees was contributed in the form of labor by the ryots, and the balance of Rupees 115-4-0 has been recommended for Government sanction.

The results of this work are not yet apparent, but there is good reason to anticipate that they will be satisfactory.

Repairing road from Angadipoorum to the Tutha River.

Estimate..............Rupees 251 3 0

Building 4 small bridges and drains on the same road from Angadipoorum to Cherpulchairy Rupees 543-10-0.

To the first of these 2 estimates Rupees 45 were added from the district funds, and the whole has been most judiciously expended by Mr. Collett the Assistant Collector. The road has been more or less improved for a distance of 6 miles, and several changes of line effected which add materially to the facility of transit.

The small masonry constructions are well executed, and have resisted uninjured the floods of a heavy monsoon.

A further outlay of about 500 Rupees, principally for tunnels, is still required to perfect this piece of road.

Repairing road from Angadipoorum to Munjerry, estimate Rupees 470–11–0
Do. Do. Malapoorum „ 538–11–0

Both these roads have been improved as far as the estimates would admit by Mr. Collett, but a much larger outlay will yet be necessary to place them in such order as to be passable by carts.

The last will form a portion of the central Malabar line, an estimate for which is now under preparation.

Not only the roads above mentioned, but nearly all the cross lines in Malabar appear to have been greatly improved of late, and it really is surprising how the Collector and his Assistants have, with comparatively small means, effected such extensive and material ameliorations. The results prove not only that their efforts have been unremitting, but judiciously applied.

Province of Coimbatore.

Public Buildings, Moonsiff's Cutcherry Oodamulcottah.

A new building and sufficiently well executed.

The estimated cost was Rupees	697	14	0
The actual... „ ... „	651	4	0
Saving	46	10	0

which balance has been subsequently expended in adding a thatched verandah or shed, with mud walls in front, for the shelter of those in attendance on the court. This though doubtless adding to the comfort of the people detracts much from the appearance of the building.

Coimbatore Cutwall's Choultry.

A convenient and substantial building, much required in the large and increasing town of Coimbatore.

Estimated cost Rupees	789	1	0
Actual do. „	764	6	0
Saving ...	24	11	0

Huzzoor Treasury alterations.

Estimate ... Rupees	1,393	11	0
Expenditure.... „	1,367	9	0
Saving...............	16	5	0

These alterations and repairs have been carried out in a satisfactory manner, and the building is much improved; but the English writer's room is ill lighted.

Bennary Choultry.

Expenditure ...... Rupees 1,363 6 3

Two choultries one at the foot, and the other at the head of the Hassanoor ghaut, were sanctioned at an aggregate cost of 3,859-3-10.

By economising on these 2 buildings, a sufficient sum has been laid apart for the construction of a 3d on a smaller scale, at Carapolliem 7 miles further on the road above the ghaut.

Great delay has taken place in the execution of these works, for which I consider the Thasildar to be much in fault.

The Bennary choultry, situated 2 miles from the ghaut foot, is at last completed, and the extensive use which has been immediately made of it, proves not only its great public utility, but moreover the inconvenience which travellers have suffered for the want of it hitherto.

The building though exhibiting some defects of construction, is upon the whole substantially executed.

Walliaur Choultry.

Estimate............Rupees 992 2 0

Which has been exceeded by „ 172 10 0

This choultry, situated half-way between Coimbatore and Paulghaut, on the trunk road, and in a very damp climate, must be a material addition to the convenience of travellers.

There are several defects in the building, which have been point[illegible]t and will I trust be remedied, but the work reflects little credit upon those who had charge of it.

Collegal Talook Cutcherry.

Estimate.... ... ...Rupees 1,694 8 0

Expenditure......... „ 1,500 12 0

A building of the ordinary kind and requiring no particular remarks, further than it occupied a long time in building, and was not well executed after all.

I append a statement received from the Collector of the expenditure on the most important Public roads in Coimbatore during the year 1852, amounting to Rupees 8,723-9-9. It also professes to exhibit the amount of export and import trade, and it would seem that although on the whole there has been an increase to the amount of Rupees 74,842, yet there has been a falling off on the Ghuzzlehutty and Neilgherry roads of 86,683 and 18,617 Rupees respectively, which Mr. Thomas supposes to be owing to limited imports and exports during the year in question.

I do not know what means are adopted to ensure accuracy in these returns, but I have not much faith in them myself. I can hardly think from what I have myself observed that any falling off can have taken place in the traffic on the Neilgherry lines.

The diminution of traffic on the Guzzlehutty road may I think be satisfactorily accounted for, by the increasing use of the new Hassanoor Ghaut.

Road from Polachee to the limits of Cochin.

This most useful and necessary line, leading from the cotton districts of Oodamulleottah and Palany towards Paulghaut, is not yet fully completed.

The road itself is nearly finished, but many tunnels have still to be built and

The Bridge across the Ootagooly Jungle stream

the largest masonry structure on the line, had not been commenced in 1852, although some materials had been prepared for it.

Direct line from Coimbatore to Kanghiem via Sooloor and Pulladum.

Estimate.......... Rupees 5,193 14 0

Some progress has been made in the improvement of this important line, though the work has not been executed in as satisfactory a manner as could be desired.

There are numerous small streams on the line, for the bridging of which no allowance has been made in the estimate, but which must be bridged if the road is to be rendered as perfect as it should be.

Noyel Bridge.

Estimate .... Rupees 4,512 10 0

With the exception of the preparation of materials, little or nothing was done towards this work during the year 1852.

Works of Irrigation.

Raising and strengthening bank of the Coorchy large Tank.

Rupees 351-1-11 have been expended on this work in 1852, and the previous outlay having been Rupees 475-10. The total expenditure is Rupees 826-11-11.

The work, which is completed, was undertaken for the security of the tank and the maintenance of the existing revenue, but in consequence of a deficient supply of water in 1852, the revenue has fallen short of that of the previous year by 445 Rupees.

The revetment or apron above the Calingarayen Anicut.

Noticed in the Report for 1851; has been completed at a total cost of Rupees 1,225-7-5, and a saving of Rupees 14-11-7 on the estimate.

It has much benefitted the channel; the increase obtained amounts to [illegible] Rupees above the revenue of 1851, which again exceeded that of the previous year by 356 Rupees. The total increase during the two years is therefore 847 Rupees.

Varapolliem Anicut and Channel.

On this work as stated in the Report for 1851 Rupees 365-14, were expended during that year. The expenditure in 1852 has been Rupees 374-5, leaving a balance on the estimate of Rupees 377-5n4.

When I last visited the work I found that one rocky portion of the channel still required deepening to the extent of ½ yard, for which the balance of the estimate ought to suffice.

The anticipated increase has not yet been realised; on the contrary a decrease of 782 Rupees has taken place, owing to the failure of the local rains on which the tank entirely depends.

Tadumpolliem tank.

This is a large ruined tank situated near the west bank of the Pullapolliem, a large channel branching from the Ambravutty.

A large jungle stream falls into it, but large breaches existing in the bank, all the water brought down by this stream, together with large quantities of sand, passed through the tank and so into the channel.

The restoration of this work would have the double advantage of collecting a large body of water in the tank during the Northeast monsoon, to be thrown into the channel at the latter end of December, when the Ambravutty was below its usual level, and also of reducing the quantity of sand carried into the channel by the stream flowing through the tank.

The project was brought forward by Major Cotton and an estimate of Rupees 4,553-6-0 for the repair of the bank, construction of a calingulah, sluice &c. received the sanction of Government.

The work was begun in 1852 and a sum of Rupees 2,441-7-0 expended upon it during that year.

Some delay took place owing chiefly to the difficulty of procuring laborers, but when I visited it in March 1853, I found that with the exception of one breach, most of the bank had been restored and the sluice substantially built.

The rate of 9 pice per cubic yard allowed for earth work proved however to be insufficient, owing the distance to which earth of a good quality had to be transported to the bank, and I recommend that an addition of 400 Rupees should be made to the Estimate.

I may add that the work has been subsequently completed, and the Tasildar of Caroor informs me that it has been of essential service in saving the crops during the excessively dry season which has just been experienced.

As will be seen from Statement No 2 the outlay on old works has yielded a fair return. The increase on the 4 works therein enumerated being Rupees 6,249.

The increase during the year 1852 consequent on the construction of the Regulating sluice for the Veerajamungalum and Nellumboor channel (noticed in the report for 1851) is said to amount to 287 Rupees.

Irrigation of the Coimbatore District.

Two statements accompany this report. The first shewing the Nunjay cultivation, Revenue, loss, cost of Repairs and other particulars for a period of some years. The second shewing the actual cultivation, Revenue, loss, &c. during the year 1852.

By the second it will be seen that the whole amount of land cultivated as Nunjay was 51,246 Cawnies, yielding an actual revenue of 507,460 Rupees. The tax paid per cawnie being Rupees 9–14–4½ on an average.

The area of land actually under irrigation was only equivalent to a square patch measuring 10¼ miles each way, or about 106 square miles, which as the area of the District is about 8000 square miles, would be 1⅓ per cent of the whole.*

The total (nominal) value of Enam land was 86,446 Rupees, being 11,35 per cent on 761,141 Rupees, the total revenue due to the whole Nunjay ayacut-

I see no reason why this land which benefits by all the improvements made by Government in the irrigation of the district, should not bear a proportional share of their cost.

The land actually cultivated and yielding revenue was 51,264 Cawnies being 78 per cent of Rupees 65,145, the whole circar ayacut after deducting enam.

The revenue derived, Rupees 507,460, from land actually cultivated was 90 per cent of 558,475, the assessed revenue of such land.

Finally the whole revenue 507,460 received by Government was 67 per cent or ⅔ds of the whole ayacut including waste and Enam lands.

The revenue respectively derived from the different sources of irrigation was as follows.

---

* Note. The quantity of land irrigated by wells is about 2¼ times and that dependent entirely on local rains 20¼ times is much in extent as the Nunjay. The former yielding about ¼th less revenue than the Nunjay land, the latter 2¼ times as much.

Bowany &c.	186,076	Rupees.
Ambravutty	136,791	„
Noyel	83,910	„
Cauvery	30,124	„
Goondul	15,811	„
Auliaur	18,373	„
Palaur and Tenellaur	6,948	„
Coothereyaur	1,666	„
Nullaur	856	„
Jungle streams and Tanks	31,895	„

An inspection of Statement No. 1 will enable a judgment to be formed of the comparative profitableness of those different sources of supply.

Ambravutty River.

The average annual revenue derived from this river for the 17 years from Fuzlies 1244 to 1260 was 125,000 Rupees from 12,724 Cawnies. The total annual loss from waste, remissions, &c. 20,257, being only 13 per cent on the circar ayacut revenue. The annual expenditure on repairs was 2,325, being Rupees 1-9-8 on the ayacut or 1-13-10 on the actual revenue. While therefore, there were only 1,307 cawnies uncultivated the loss by which was about 9,440 Rupees, the annual amount remitted upon cultivated land was 10,800 Rupees.

The Ambravutty drains an area of upwards of 3,000 square miles, including the southern slopes of the Dullee or Palaney range of Hills, and is partially affected by the south west monsoon. For a considerable portion of the year therefore, it has a fair supply and at times a very large one, but at the latter end of the season, this frequently fails, and the crops suffer much in consequence and the necessity arises for large annual remissions in the worst cases.

Notwithstanding this however, land under this river is eagerly sought after, fetches high prices and yields much of it 2 and some even 3 crops.

It would therefore be most desirable not only for the purpose of securing the existing cultivation and obviating the necessity for remissions but also as being likely to lead to an increase, to ensure a better supply during the latter period of the season.

It has been proposed to throw an additional supply of water into the Ambravutty, by diverting a portion of the stream of the Palaur a river now running towards the west. But this could not be done except at a considerable cost, and even if done would hardly produce any sensible effect upon the river during the very season when the want of water is most felt. Moreover it would at that critical time deprive the cultivation under the Palaur or

Auliaur and also several tanks in the neighbourhood of Oodamulcottah, supplied by a channel from this stream, of their usual supply already complained of as defective.

The only real remedy is the formation of large tanks either in the Dullee Hills or near their foot. In these the superfluous water of the high freshes might be received and stored up for use during low states of the river.

I have only paid one short visit to this part of the district, and am not therefore prepared to say with confidence whether such reservoirs are capable of being profitably formed or not, but my impression, from what I did see, is that they may ; when the examination of the Mayaur and Bowany villages is completed, this point will be taken up.

Noyel River.

The area of drainage of this river is much more circumscribed than that of the Ambravutty, not exceeding 1,300 square miles, and owing to the confined extent and eastern aspect of the Bolumputty valley in which it has its source, the supply is anything but abundant.

The total circar ayacut for the year under review was 12,283 cawnies, (143,556 Rupees,) of which 9,496 were cultivated and should have yielded 115,034 Rupees, but the actual revenue did not amount to more than 83,910, or 73 per cent. of which it should have done ; a result doubtless mainly owing to an insufficient supply of water.

From Fuzlies 1244 to 1260 (inclusive) the average annual assessment was 1,38,694, the settlement only 66,197, the per centage of loss on the ayacut revenue being 52, or rather more than half.

The per centage of repairs on the revenue was Rupees 6-13-1.

These figures shew that the irrigation under this stream is both scanty and costly, and unfortunately the circumstances of the river do not hold out any good prospect of great amelioration.*

I examined the Bolamputty valley with a view to the formation of a tank, but I confess that the limited extent of the area of drainage hardly holds out much hope of a really capacious reservoir receiving full supplies.

It has been proposed to turn a small stream now finding its way to the western coast into this river and although I believe the project to be practicable, yet the expense would I think be larger than the advantage to be gained would justify.

---

* Note. The loss to Government during the year 1852 by uncultivated land was 15,035, that by remissions more than double, being 31,124. Shewing that an attempt is made to cultivate much more land than there is a supply of water for. The total loss was nearly 3 times as great as that under the Ambravutty with a cultivation 60 per cent. more extensive.

The Sunganore stream rising in the valley south of Lambton's peak, also finds its way into the Noyel, and the formation of a tank there would assist in forming a store for dry periods, but the falls of rain there are very uncertain and altogether I fear that a tank there would not pay.

Before however finally deciding against these projects for the improvement of this river, the valleys both of Bolumputty and Sunganore will be gauged, and estimates of the cost of forming tanks made.

We shall then be in a position to form an accurate judgment on the question.

The 3 most important channels are those of Chittrachavady, Cooniamootore, and Coimbatore, irrigating land mostly situated in the immediate neighbourhood of the Huzzoor. Owing to this proximity the land under them has a value which it would not have elsewhere, and consequently but a small portion is uncultivated, about $\frac{1}{10}$th, but the difference between the assessed value and actual return is considerable, viz. 19,559 Rupees or nearly $\frac{1}{4}$th of the former.

The Chittrachavady channel is greatly in want of proper sluices, and the different tanks under it stand urgently in need of a thorough repair.

Cauvery River.

There are 4 channels taken from this river for the irrigation of lands in this district.

The first which is supplied by a rough stone dam, irrigates almost exclusively Jagheer lands in Colligaul, the circar cultivation under it being a mere trifle.

The 3 others are Corumboo channels for the supply of Nunjay cultivation in Caroor.

The revenue yielded by these 3 channels is sufficiently good, the quantity of waste and remissions being small. Nevertheless they stand much in need of improvement, and money may be profitably expended upon them. What they require is one common head taken off the rise river above the mouth of the Noyel. In event of an additional supply being thrown into the Calingarayen, these channels would also be much benefitted by it.

Owing to the defective form of the head of the Pogaloor channel, the outlay in repairs bears a large proportion to the Revenue, Rupees 8 annas 5 pice 9 per cent.

Auliaur River.

Rises in the Anamullay Range of Hills and flows to the western coast. Its supply is generally both abundant and constant. The 5 anicuts and channels in its course are all capable of improvement, with good prospect of large return on the outlay. The neighbourhood has always been feverish, but owing to the extensive clearing of jungle which has taken place of late years, matters in this respect are much improving.

A large extent of rich virgin soil hitherto covered with jungle has of late been granted on very favorable cowl, and I have no doubt that the great profit derived from this class of cultivation has (the population being scant) in some measure interfered with the extension of Nunjay cultivation. When the best of the jungle is taken up and cleared and the population and healthiness of the neighbourhood thereby increased, we may hope for a considerable extension of the Nunjay cultivation, and in the meantime it will be advisable to place the anicuts and channels in a condition to supply the additional demand for water which is likely to arise.

Nullaur.

A small but rather abundantly supplied stream rising near Amoor and irrigating a small amount of Nunjay in the Cheyoor Talook. There is a good site for a tank, between Kuroovaloor and Ramnadpoorum, and the formation of such a work would doubtless prove highly remunerative.

Paulaur and Tenullaur.

2 Streams flowing from the Dullee range and crossed by anicuts supplying a set of tanks near Oodamulcottah.

The repair and improvement of the upper of the 2 anicuts will have the effect of improving the supply to these tanks, but I do not anticipate any material increase in the cultivation.

The portions of these streams passing over the anicut unite, and form one main feeder of the Auliaur river.

Goondul River or Pullum.

Is a small but very constantly and abundantly supplied stream, rising in the mountains south of Caligaul, and on which the supply of the far larger proportion of irrigated land in that talook depends.

I have no doubt but that by the adoption of proper measures, the water of this stream might be made to irrigate a much larger amount of land than it now does. There is a good site for a tank east of Caligaul, capable of containing a very large store of water, and the construction of such a reservoir would not only have the effect of bringing more land under cultivation, but would materially add to the security of the existing tanks, which being of small capacity are frequently threatened by the superabundant supplies thrown into them at times when they already full.

Bowany River.

The wet cultivation under this river is the most extensive and best irrigated in Coimbatore, as might be expected from the abundant character of the stream. Nevertheless even here, at the termination of the season a scarcity of water is felt, a circumstance which taking into consideration the enormous amount which passes down the river during the whole year and the comparatively small extent of cultivation it has to supply, demonstrates clearly the urgent necessity that exists for some means of storing up the water of high freshes, now mostly wasted, for use during the dry portion of the season.

Reservoirs with this object might be formed either on the Hills, in the valley of the Bowany or in that of the Moyaur.

There are several configurations of ground on the Hills peculiarly favorable for the formation of tanks, but the objection to their adoption there is the small volume of the supplying streams, which would hardly admit of a very large reservoir being filled as abundantly as could be desired.

The Bowany itself might be dammed up near the village of Nellethoray, and the Moyaur above that of Guzzlehutty.

Having examined these valleys I am inclined to think that the damming up the Moyaur offers the most advantages, and I have directed a series of levels and sections to be taken, which though not yet complete enables me to form a probable estimate of the cost and advantages of such a work.

The point where I propose to throw a bank across the valley is a little above the village of Guzzlehutty and the approach to that Ghaut.

This portion has one advantage which is not common to any others that I have seen, viz., that the whole of the land which would be laid under water is waste and uninhabited.

The length of the bund would be exactly 1 mile and the proposed height of the water 100 feet above the high bank of the river. The fall of the river is unfavorably great being about 30 feet per mile ; nevertheless, a bund of the height proposed would retain 150,000,000 cubic yards of water.

Extensive Calingulahs amply sufficient for the discharge of all the water entering the tank after it rose to the determined level, could be formed at a comparatively trifling expense.

One of the most expensive items in the estimate would be the sluices, several sets of which on different levels (to admit of facility of working) would be necessary with such a depth of water.

The section of the bank in the middle would necessarily be very formidable, but it would diminish rapidly as it receded on each side.

The revetment owing to the facility of procuring stone would not be expensive, but the stony nature of the soil and the difficulty of procuring earth sufficient for the bund, would largely enhance the cost of this principal part of the work. I estimate roughly the cost of the whole project at 300,000 Rupees, and large as this sum may appear, I think it can be shewn that it would still be highly profitable.

The Moyaur is the principal feeder of the Bowany and has a drainage area of about 690 square miles. The climate is damp and liable to the influence of both monsoons but especially the south west one.

I have no means of stating what the rain fall is, but I should judge it to be not less than 50 inches per annum." The quantity of water brought down by this river would however beyond all doubt be amply sufficient to fill such a tank as that now proposed several times.

I have never known or heard of the stream failing altogether even during the driest season. A fresh usually occurs at the latter end of March or beginning of April sufficient to fill such a reservoir ; during the whole of the south west monsoon it would be kept full and remain so at its termination.

It would also generally receive a sufficient quantity to fill it again, during the north east monsoon in October, November or December, and this latter supply would last long enough to be of the most essential service to the cultivation, especially that under the Calingarayen channel, during the months of February and March.

With regard to the returns I think it may be safely assumed that such a reservoir would save and utilize twice its fill or 300 million cubic yards of water now running to waste.

The cost of this would be

Interest at 4 per cent on 3 lacs......	12,000 0 0
Cost of repairs and management....	8,000 0 0
Rupees...	20,000 0 0

Supposing the 300 millions of cubic yards of water saved to be applied simply to the irrigation of new land (of which there is abundance lying waste both in Danaickencottah and Suttimungalum) yielding only 5 Rupees per cawnie for a crop, we should have a return of 150,000 Rupees* annually, but as much of it would be available at the very period of the season when water is most scarce and when even small quantities are most valuable to prevent the destruction of the crops, its value would really be much more.†

That a considerable quantity of land lying immediately under the tank would be brought under cultivation, I see no reason to doubt, but the additional supply afforded to the Bowany channels would probably be the most valuable result.

---

* 30,000 cawnies × by 10,000 cubic yards supply for 1 cawnie = 300,000,000.
30,000 cawnies × by 5½ = 150,000.

† Note. Colonel Cotton estimates the value of water for irrigation purposes alone at 1 Rupee for 500 cubic yards, and Captain Baird Smith gives its value in the N. W. Provinces at 1 Rupee per 600 cubic yards, taking the lowest of these two values and entirely leaving out of account its value for purposes of navigation the money value of these 300 millions cubic yards of water would be 500,000 Rupees. The first outlay would be 1 Rupee for 1,000 cubic yards and the annual cost including interest 1 Rupee for 15,000 or $\frac{1}{25}$th of its value.

Land under the Thuddapully and Arckuncottah channels, now bearing one crop, would then yield and pay for two, and the project for the improvement and extension to Caroor of the Calingarayen channel, the only objection to which is the deficiency of water at the latter end of season, would then be perfectly feasible.

The Cauvery channels would also benefit by the additional supply thus thrown into the Calingarayen.

I shall not enter into the advantages likely to be gained in other ways, but there is one the value of which cannot I think be too highly estimated and which might be secured by this project, viz., the opening of the Inland water communication from Suttimungalum to the mouth of the Ambravutty during the whole year.

I am not prepared to say that a less costly or more profitable reservoir cannot be found in other parts of the district, (numerous surveys and sections will be required before this point can be settled) but I believe from observations already made that the project above sketched will not cost more or yield less than I have said.

There are 4 channels supplied by this river.

The Thuddapully and Arckuncottah channels having been noticed in a former report, do not require particular notice here. The sanctioned works for their improvement are now in progress, and judging by the eagerness manifested to secure land under the proposed new branches, I have every reason to hope that the estimates made of their probable beneficial effect on the revenue will be largely exceeded.

The Calingarayen channel stands as much in need of reformation, and Estimates for that purpose will be forwarded as soon as the proper examinations are completed, but from all that I have learnt regarding the supply of this channel during the latter period of the season, I do not think it would be prudent to recommend any large increase of cultivation under it until some means (such as the tank above alluded to) are adopted for increasing the supply at that time.

Since my last report I have examined the state of the Conniampollien channel, the first supplied by the Bowany.

A reference to the Statement No. 1 will shew that this has been probably the least remunerative work ever executed in this or any district in the Presidency.

It was a ruined work when the district came into the hands of our Government and was restored about 30 years ago.

Several reasons have combined to render the returns so unsatisfactory. The principal one probably is the extreme unhealthiness of the locality which is the constant abode of jungle fever, and moreover much infested by wild beasts. These circumstances have tended not only to drive away the cultivators, but also I believe had the effect of deterring the different authorities from seeing that the money said to have been laid out upon it was actually so spent.

I cannot help thinking myself (judging from the state of the channel) that the annual repairs have never been properly carried out, and this is very likely to have produced the worst results, as the channel is liable to be loaded with sand brought in by numerous jungle streams, and to be choked by the thickly overgrowing jungle.

But there is still another reason why the cultivation has never thriven, which is, that the channel has never been properly excavated. This appears by the levels, but might be suspected from the fact of a scarcity of water being constantly complained of at the extremity. The channel at the same time being one of the best supplied at its head in the district and having a very trifling extent of land to irrigate.

What the channel requires is a proper regulation and deepening of the bed in parts and the removal of masses of rock. This with the addition of several sand sluices would place it in proper order. But the cost would be about 5,000 and I feel doubtful about recommending so large a sum for sanction seeing the extreme unhealthiness of the neighbourhood.

Something is now doing for the removal of the jungle, and the interest which the Assistant Mr. C. E. G. Thomas now in charge of the talook takes in this work, will ensure its having full justice done to it in future.

Employment of Officers, Overseers and Surveyors.

The Acting Civil Engineer joined the division at the latter end of April, and was employed in May and the greater part of June in an inspection of the works in Malabar from Cannanore to Cochin.

In July and part of August he was similarly occupied in Coimbatore, Suttimungalum, Colligaul, and during the latter end of August and early part of September, superintended the operations at the Ootacamund Lake Bund.

During the remainder of the year he was occupied in an inspection of different parts of the province of Coimbatore, but principally in the examination of and preparation of estimates for the large Bowany channels.

The Assistant Civil Engineer (who had charge of the division for the 1st quarter of the year) in the months of January and February made a tour of inspection through the northern and western portions of Coimbatore, and in March and April was similarly employed in Malabar. He accompanied the acting Civil Engineer in his Malabar tour and was employed during June and

July in the inspection of works on the hills, and after the occurrence of the accident to the Ootacamund lake bund, he superintended the repairs which occupied him chiefly until he left the division in November.

The Overseer now attached to the Superintendent of the Anamullay forest was for the 1st half of the year in the Engineer establishment.

About ½ of his time was employed in superintending the execution of works,

⅓d in travelling on duty,

⅓d in sundry employ, chiefly connected with the forest, and the remainder on leave or sick.

Of the 2 other Overseers still retained on the establishment the time was distributed in about the following proportion.

Superintending execution of works	75
Travelling on duty	5½
Office work, accounts, drawing, &c.	13
Inspection of works	1½
Sundry employ	5
Total......	100

The time of the 2 Surveyors was distributed in the following proportion.

Inspection of works	7
Travelling on duty	10
Plotting Surveys, laying down levels, plan drawing, estimating and other Office works	52
Surveying, levelling, taking measurements of roads &c. for estimating	21
Superintending execution of works	3
Sundry employ, sick leave &c.	7
Total......	100

The third item at once strikes one as being excessively large and there are two reasons for the 1st. The unnecessary amount of time taken by the Surveyors for plotting and drawing their Surveys, a waste which ought to be put a stop to, and 2d, the necessity, owing to no plan drawer and estimate maker being allowed to the Engineer, for employing the Surveyors for those duties.

The wastefulness of employing people on pay vary from 100 to 300 Rupees per month to execute the duties which might be equally well performed at the rate of 50, is too palpable to require comment.

There should certainly be a regularly instructed plan drawer and estimate maker attached to each division, his salary would be about 50 Rupees per month, and if to this were added a native surveyor (on a like salary) capable of executing all the ordinary surveys and levels of channels, roads, sections of rivers, &c., the Surveyor's attention might then be devoted, as it should be, to the inspection and examination of ordinary works and framing of the necessary estimates for the repair.

I shall conclude this report by bringing to notice the great need which exists in the district of Coimbatore of an Engineer store and work shops. The difficulties and delays in the execution of public works arising from this want cannot be too strongly insisted upon.

At present the officer in charge of a large work is dependent upon the Thasildars for all the various apparatus and appliances which he requires. These functionaries hardly ever supply even such things as is in their power to furnish without serious delays, and the articles supplied are frequently unsuitable or unserviceable. But many things, I may say most things, which are wanted for the proper execution of a large work they have no means of supplying, as they are not procurable for love or money in the district. The Engineer must in such cases either manage to procure them himself (sending to the Presidency or perhaps even to England) or adopt more imperfect and therefore more costly substitutes.

The difficulty of procuring artificers in this district is such that at times it amounts to an impossibility.

For the remedy of these evils I therefore strongly recommend the establishment at some central point in the district of an Engineer store and work shop, with a proper establishment of artificers.

It is unnecessary to enter here into the details of this project, but I may state that after careful calculation I find that the cost of the necessary buildings and apparatus would not exceed 10,000 Rupees, and that of the establishment including an artificer as Overseer would be somewhat less than 300 Rupees monthly or 3,600 per annum.

That this sum would be saved to Government over and over again even in the execution of the more ordinary description of artificers' work required for public buildings, I have no manner of doubt, but the value of such an establishment in the execution of large works cannot be too highly appreciated.

Civil Engineer's Office,
7th Division, Teak Dimmum,
19th May, 1854, Hassanoor Ghaut.

S. O. E. LUDLOW,
Acting Civil Engineer 7th Division.

	Names of Villages and Channel, &c.	From to what period.
	1	2
Bowany river...	Canyempolliem channel	From Fusly 1257 to 1260.
	Thadapully do.	1231 to 1260.
	Ureuncottah do.	do. to do.
	Calingaroyen do.	do. to do.
Cauvery river...	Danagherry do.	1245 to 1260.
	Pagaloor Coimboo do.	1244 to 1260.
	Vangul do. do	do. to do.
	Neroor do. do.	do. to do.
Ambravutty river.	Cullapoorum anicut channel.........	do. to do.
	Comaralingum do. do.	do. to do.
	Cunnadypootoor do. do.	do. to do.
	Cadatoor do. do.	do. to do.
	Carvoor do. do.	do. to do.
	Chalamadavee do. do.	do. to do.
	Caratodoovoo do. do.	do. to do.
	Alungum do. do.	do. to do.
	Dalavoyputtanum do. do.	do. to do.
	Daharapooram do. do.	do. to do.
	Colinjeevadee do. do.	do. to do
	Nunjatalyoor do. do.	do. to do.
	Soondacoypolliem do. do.	do. to do.
	Chinnadarapoorem do. do.	do. to do.
	Nunjacalacoorety do. do.	do. to do.
	Pullapolliem do. do.	do. to do.
	Teramenelloor Corumboo do.	do. to do.
	Balambapoorum do. do.	do. to do.
	Punchamadavee do. do.	do. to do.
	Suncaparetty do. do.	do. to do.
	Poolyoor do. do.	do. to do.
	Coyempully do. do.	do. to do.
	Total Ambravutty......	
Noyel river anicut channels, 24		From Fusly 1244 to 1260.
Aylar do. do. 5		do. to do.
Jungle streams and Tanks, &c.		1245 to 1260.

No. 2.

Statement of the Nunjay Ayacut Cultivation and Revenue in the District of Coimbatore during the year 1852.

Names of Channels, &c.	Total Ayacut.		Deducted Enaum Lands.		Circar Lands.		Deducted Waste Lands.		Cultivation.		
	Cawnies.	Assessment.	Cawnies.	Assessment.	Cawnies.	Assessment.	Cawnies.	Assessment.	Cawnies.	Assessment.	Settlement.
Daungherry Anicut and Channel.	537 6	4,575 10 11	535 14¾	4,342 15 1	21 7¼	232 11 10	19 4½	208 15 1	2 2¾	23 12 9	15 14 4
Poogaloor Corumboo Channel......	1,386 11½	9,644 15 5	142 12¼	1,210 14 11	1,243 15	8,434 0 6	124 6½	755 13 5	1,119 8½	7,678 3 1	7,668 12 8
Vungal do. do.	745 10½	10,669 14 10	93 7¼	1,319 12 6	622 3	9,350 2 4	25 9½	330 1 4	596 9½	6,020 1 0	9,130 5 6
Nerroor do. do.	1,215 10¼	15,164 15 5	102 13¼	1,305 12 6	1,112 13½	13,859 2 8	79 1¾	710 1 8	1,033 11½	13,149 1 0	13,279 9 11
Total......	3,875 6½	40,055 8 7	874 15¾	8,179 7 3	3,000 6¾	31,876 1 4	248 6¼	2,004 15 6	2,752 ½	29,871 1 10	30,124 10 3
Cunniempolliem Anicut & channel.	643 4	2,987 15 2	99 2	524 12 11	544 2	2,463 2 8	369 5¾	1,592 13 9	174 12¼	870 4 6	791 10 10
Codevaily { Thuddapully do. ...	8,054 10¼	100,275 3 4	365 11½	6,751 11 1	7,688 15	93,523 8 3	754 11½	8,609 13 7	6,934 3¼	84,113 10 8	80,384 1 5
Anicut. { Arckancottah do. ...	1,933 9½	21,910 13 7	79 12¼	1,155 10 7	1,853 13¼	20,755 3 0	206 10¾	2,565 15 0	1,647 3	18,189 14 0	18,017 4 0
Calingaroyen Anicut and channel.	6,167 4¾	100,844 15 1	606 3¼	12,694 10 11	5,561 1	88,150 4 2	174 14½	2,665 5 2	5,386 2¾	85,484 15 0	86,883 4 8
Total......	16,798 13	226,018 15 2	1,150 13¼	21,126 13 6	15,647 15¼	204,892 1 8	1,505 10	15,433 15 6	14,142 5¼	189,458 2 2	186,076 4 11
Cullapoorum Anicut and Channel.	645 12½	4,670 1 9	41 10¼	312 13 6	601 2¼	4,357 4 3	56 8¾	337 1 3	544 9½	4,020 3 0	3,968 10 8
Comarulingum do. do. ...	873 14¼	9,580 11 2	64 10	702 11 3	809 4¾	8,877 15 11	11 12½	86 4 6	797 8½	8,791 11 5	6,684 1 6
Kunnadypothoor do. do. ...	392 6¼	5,580 5 4	64 3¼	892 6 10	328 3½	4,687 14 6	4 3½	30 7 6	324 0	4,657 7 0	4,677 [illegible] 8
Cuddathoor do. do. ...	674 6	8,142 7 9	100 13¼	1,278 0 6	573 8¼	6,864 7 3	1 8	23 0 10	572 ¼	6,841 6 5	7,043 10 9
Cunniyoor do. do. ...	199 12¼	2,573 12 11	21 2¼	231 9 0	178 9½	2,342 3 11	6 6¾	35 13 0	172 2¾	2,306 6 11	2,226 2 2
Cholanathavy do. do. ...	380 1	5,404 1 3	87 15	1,218 13 10	292 2	4,155 3 5	12 15¼	80 12 9	279 2¾	4,074 6 8	4,221 2 0
Karathooloovoo do. do. ...	286 7¼	4,029 9 10	27 11¼	390 5 8	258 11½	3,639 4 2	7 14¾	64 9 8	250 12¼	3,574 10 6	3,632 6 1
Alingum do. do. ...	729 3¾	11,265 3 1	92 10½	1,298 7 11	636 9¼	9,966 11 2	20 10	274 4 1	615 15¼	9,692 7 1	9,322 10 8
Thullavoyputtanum do. do. ...	570 2¼	6,587 4 9	115 2¾	1,685 9 2	424 15½	4,901 11 7	13 5	93 12 9	411 10½	4,807 14 10	4,290 7 9
Dharapoorum do. do. ...	1,695 9¾	26,242 14 7	274 13¼	4,352 3 3	1,420 12¼	21,890 11 4	20 8½	206 15 6	1,400 3¾	21,683 11 10	20,159 9 4
Colingeevaudy do. do. ...	2,083 10	22,795 6 1	158 6¼	2,444 4 11	1,885 3¼	20,351 1 2	17 5½	136 4 7	1,867 13¼	20,214 12 7	17,993 2 2
Nunjathalayoor do. do. ...	169 6½	1,690 11 2	36 15	413 4 8	132 7½	1,286 6 6	17 14¼	107 13 11	114 9¼	1,178 8 7	1,300 4 5
Choondakoypolliem do. do. ...	127 11¼	941 2 7	3 0	17 10 0	124 11¼	923 8 7	6 1½	53 0 11	118 9¾	870 7 8	848 8 0
Chinna Dharapoorum do. do. ...	1,353 10¾	10,282 11 4	119 1¼	969 2 1	1,214 9	9,313 9 3	78 13¾	587 4 2	1,135 11¼	8,726 5 1	8,289 8 4
Nunjeealacooroochy do. do. ...	215 11	1,766 3 2	11 1	122 15 11	204 10	1,643 3 3	27 2½	232 1 7	177 7¼	1,411 1 8	1,420 11 6
Pullapolliem do. do. ...	2,564 0	20,591 12 9	151 14¾	1,413 11 11	2,412 1¼	19,178 0 10	71 11	469 7 0	2,340 6¼	18,708 9 10	18,828 0 5
Thiroomanellore Corumboo do. ...	636 ¼	4,857 6 4	60 2¼	545 14 10	575 14	4,311 7 6	54 9¼	315 11 7	521 4¼	3,995 11 11	4,048 3 4
Bolambapoorum do. do. ...	546 5¾	4,314 1 2	363 12¼	2,768 7 1	182 9	1,545 10 1	9 5¾	55 5 7	173 3¼	1,490 4 6	1,488 12 3
Punjanathavy do. do. ...	282 13¼	2,571 6 2	23 6½	264 2 0	259 7¼	2,307 4 2	43 11½	272 6 11	215 11¾	2,034 13 3	2,096 9 2
Chemmaparetty Anicut and do. ...	470 7¼	4,920 11 11	37 11	393 15 7	432 12½	4,526 12 4	79 12½	705 12 6	353 0	3,820 15 10	3,897 2 3
Polioor do. do. ...	994 8½	8,519 3 7	103 13	1,003 7 10	890 11½	7,515 11 9	124 14¾	688 2 3	765 12¼	6,827 9 6	6,971 9 3
Coyempully do. do. ...	627 0	4,958 5 9	52 4½	308 12 3	574 11½	4,449 9 6	177 13	1,241 4 11	396 14½	3,208 4 7	3,382 13 10
Total......	16,499 2¼	172,294 10 5	2,085 7½	23,258 14 0	14,413 10¾	149,035 12 5	865 ¾	6,097 13 9	13,548 10	142,937 14 8	136,791 7 8
Bolamampatty Anicut & Channel.	1,610 0	16,326 10 6	38 9¼	422 9 9	1,571 6¼	15,904 0 9	1,030 4	10,516 12 10	541 2¾	5,387 3 11	3,828 10 10
Chittrachavady do. do. ...	3,037 3¼	43,264 11 4	125 1¼	1,886 14 10	2,912 1¼	41,377 12 6	401 6½	4,844 8 1	2,510 11¼	36,533 4 5	25,776 3 10
Cooniamooftoor. do. do. ...	1,760 14¼	14,509 0 8	812 6½	7,258 1 4	648 8¼	7,250 15 4	81 2¾	483 11 2	867 5½	6,767 4 2	4,911 12 3
Coimbatore. do. do. ...	2,061 12½	28,991 10 1	147 5	2,176 9 10	1,914 7½	26,815 0 3	140 2	1,646 13 9	1,774 5½	25,168 2 6	18,222 9 9
Coorchy do. do. ...	492 1	4,202 15 0	82 11¼	749 7 5	409 5¾	3,453 7 7	154 9	1,042 3 4	254 12¾	2,411 4 3	1,762 7 10

Statement of the Nunjay Ayacut Cultivation and Revenue, &c.—(Continued.)

	Names of Channels, &c.	Total Ayacut.					Deducted Enaum Lands.					Circar Lands.					Deducted Waste Lands.					Cultivation.							
		Cawnies.		·Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Settlement.		
Noyel River.	Vellaloor Anicut and Channel.	452	12½	4,830	4	8	49	0	570	6	9	403	12½	4,259	13	11	72	2	684	0	5	331	10½	3,575	13	6	3,223	11	9
	Singanellore do. do. ...	1,100	12	13,479	8	9	327	4½	4,444	1	6	773	7½	9,035	7	3	163	12½	1,782	9	11	609	11	7,252	13	4	5,651	11	3
	Wudderpolliem do. do. ...	703	14½	7,574	7	11	53	10	718	8	3	650	4½	6,855	15	8	63	13	977	8	2	586	7½	5,878	7	6	4,704	6	4
	Erookoor do. do. ...	416	4	6,392	14	5	33	5¼	507	5	10	382	14¾	5,886	8	7	104	12	1,666	9	1	278	2¾	5,219	15	6	2,840	0	1
	Sooloor do. do. ...	594	3¼	6,717	1	8	86	8	1,087	0	11	507	11¾	5,630	0	9	152	10	1,460	12	0	355	1¾	4,169	4	9	3,229	2	11
	Rasypolliem do. do. ...	291	10½	3,793	2	0	27	3¼	357	9	9	264	7¼	3,435	8	3	58	3½	704	9	6	206	3½	2,730	14	9	1,664	0	2
	Chamalapoorum do. do. ...	186	10	1,556	12	6	1	11	17	6	11	184	15	1,539	5	7	13	5½	109	8	4	171	9¼	1,429	13	3	1,206	5	6
	Pullapolliem do. do. ...	95	7¼	1,242	6	11	17	13½	208	3	8	77	7½	1,034	3	3	3	1½	25	3	9	74	6	1,008	15	6	739	5	9
	Agrarapoothoor do. do. ...	131	4	1,312	5	9	13	15¼	116	0	2	124	4¾	1,196	5	7	11	9¼	90	13	9	112	11½	1,105	7	10	1,006	12	0
	Mungalum do. do. ...	141	11	1,306	7	3	20	4½	202	13	7	121	6¾	1,303	9	8	23	7	170	13	8	97	15¾	1,132	10	3	810	4	8
	Andypolliem do. do. ...	159	15	1,262	6	6	9	9½	88	1	4	150	5½	1,174	5	2	51	1¾	386	0	0	99	3¾	788	5	2	378	3	7
	Tripoor do. do. ..	150	8¼	1,426	11	3	26	11	244	14	11	123	13¼	1,181	12	4	36	1½	298	14	10	87	11¼	882	13	6	728	11	5
	Mothalypolliem do. do. ...	106	15¼	855	10	5	22	15½	202	6	9	84	¼	653	3	8	26	13¾	175	13	11	57	2½	477	5	9	407	2	0
	Mathapoor do. do. ...	188	8½	2,105	8	2	26	½	343	10	2	162	8	1,761	14	0	9	14½	101	11	0	152	9¼	1,660	3	0	923	15	8
	Sonnaudlore do. do. ...	48	12¼	538	14	10	7	12	102	9	2	41	¼	436	5	8	8	15	93	6	9	32	1½	342	14	11	351	12	2
	Chonnandanpolliem do. do. ...	62	1¼	961	1	11	2	8½	29	14	1	59	8¾	631	3	10	1	13	20	8	7	57	11¾	613	11	[illegible]	360	13	10
	Munnurray do. do. ...	42	15¾	379	15	3	3	14	21	6	6	39	1¾	358	8	9	6	8½	43	13	5	32	9¼	314	11	[illegible]	280	13	1
	Agraraperriapolliem do. do. ...	124	15¼	943	0	0	22	15½	301	0	0	102	0	642	0	0	31	11¼	300	3	11	70	4¾	341	12	1	262	13	7
	Vuddookapolliem do. do. ...	81	1	589	4	8	0	0	0	0	0	81	1	589	4	8	27	14	244	12	3	53	3	344	8	5	344	8	5
	Cuthangany do. do. ...	226	12¾	1,338	0	0	33	4½	191	9	8	193	8½	1,146	6	4	112	3	649	12	3	81	5½	496	10	1	294	4	11
	Total......	14,276	2¾	165,805	0	5	1,992	9	22,248	13	1	12,283	9¾	143,556	3	4	2.787	4¾	28,521	12	8	9,496	5	115,044	6	8	83,910	10	7
Auliar River.	Pullivalungal Anicut and Channel	396	15½	2,362	6	3	13	5	89	12	7	383	10½	2,272	9	8	108	15	589	1	10	274	11¼	1,683	7	10	1,683	7	10
	Ariapuram do. do. ...	754	9¾	3,700	12	6	6	14	49	13	1	747	11¾	3,650	15	5	79	2½	358	2	3	668	9¼	3,292	13	2	3,292	13	2
	Perriauay do. do. ...	1,328	6¼	9,020	15	4	105	6	645	2	10	1,223	½	8,375	12	6	552	2	3,718	2	1	670	14¼	4,857	10	5	4,312	9	1
	Caraputty do. do. ...	410	13	2,867	8	11	27	1	176	13	11	383	12	2,690	11	0	117	0	773	10	7	266	12	1,917	0	5	1,921	1	0
	Vadacaloor do. do. ...	462	12¼	3,074	13	8	47	9	324	0	1	415	3¼	2,750	3	7	109	2¾	604	4	2	306	½	2,146	9	5	2,163	10	10
	Total......	3,353	8¾	21,026	8	8	200	3	1,285	10	6	3,153	5¾	19,740	14	2	966	6¼	6,043	4	11	2,186	15½	13,697	9	3	13,373	9	11
Nullaur River.	Neraperichel Corumboo Channel.	4	9½	25	6	1	....	......	....	0	0	4	9½	25	6	1	2	4¾	12	11	1	2	4¾	12	11	1	10	8	6
	Tholtipolliem do. do. ...	14	5	105	0	3	....	......	....	0	0	14	5	105	0	3	9	6¼	68	10	9	4	14¾	36	5	6	25	14	7
	Nullato Caravuly Anicut & do. ...	82	11¾	441	4	11	4	9½	27	2	10	78	2½	414	2	1	24	8½	136	3	0	53	10	277	15	1	266	10	0
	Vokalpolliem do. do. ...	15	5½	166	11	1	2	12½	36	2	1	12	9	130	9	0	0	13¾	6	2	1	11	11¼	124	6	11	123	7	11
	Shempanaloor do. do. ...	13	10¼	169	14	9	....	......	....	0	0	13	10¼	169	14	9	3	¾	39	12	0	10	9¼	130	2	9	99	9	9
	Vatoopolliem do. do. ...	18	15	197	5	10	....	......	....	0	0	18	15	197	5	11	0	6	5	12	10	18	9	191	9	0	191	9	0
	Aunnapolliem do. do. ...	28	12	318	1	10	10	6	141	4	1	18	6	176	13	9	4	14	43	5	11	13	8	133	7	10	138	9	3
	Total.....	178	5	1,423	12	9	17	11¾	204	9	0	160	9¼	1.219	3	9	45	6	312	9	8	115	3¼	906	10	1	856	5	0

Statement of the Nunjay Ayacut Cultivation and Revenue, &c.—(Continued.)

	Names of Channels, &c.	Total Ayacut.					Deducted Enaum Lands.					Circar Lands.					Deducted Waste Lands.					Cultivation.							
		Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Settlement.		
Palaur and Tennalaur Rivers.	Periacollum	868	½	5,777	5	7	66	7¼	479	3	1	801	9¼	5,298	2	6	266	6½	1,714	5	7	535	2¾	3,583	12	11	2,614	14	1
	Kurrusee Collum	152	¾	1,039	1	4	12	5	81	2	8	139	11¾	957	14	8	32	10	217	4	8	107	1¾	840	10	0	667	8	7
	Tennah Collum	146	2¼	1,093	0	8	20	10	128	4	7	125	8¼	964	12	1	19	9	126	3	9	105	15¼	838	8	4	728	9	9
	Chetty Collum	186	9¼	1,447	5	0	35	¼	258	7	2	151	9	1,188	13	10	32	13¼	233	7	6	118	11¾	955	6	4	846	3	5
	Alum Collum	221	8	1,111	9	8	6	10¼	30	8	3	214	13¾	1,081	1	5	91	3½	454	1	1	123	10¼	627	0	4	347	2	1
	Shen Collum	239	7¼	1,226	15	2	6	2¼	36	1	4	233	5	1,190	13	10	169	9	829	13	4	63	12	361	0	6	318	9	2
	Poojaree Naicken Collum	55	6¾	292	6	8	0	0	0	0	0	55	6¾	292	6	8	30	4½	147	1	10	25	2¼	145	4	10	140	0	6
	Kundadoothamanicum Collum	233	3½	1,594	6	11	20	14¾	155	12	9	212	4¾	1,438	10	2	100	11¼	735	12	11	111	9¼	702	13	3	565	10	8
	Thooloo Natta Collum	99	¼	747	13	7	2	10¾	15	11	2	96	5½	732	2	5	30	6¾	89	11	6	82	14¾	642	6	11	526	15	9
	Vullayapolliem Channel	40	0	176	4	7	0	0	0	0	0	40	0	176	4	7	0	0	0	0	0	40	0	176	4	7	176	4	7
	Kistnapoorum Channel	8	0	16	0	0	0	0	0	0	0	8	0	16	0	0	0	0	0	0	0	8	0	16	0	0	16	0	0
	Total	2,249	6½	14,522	5	2	170	12½	1,185	3	0	2,078	10	13,337	2	2	756	10	4,547	14	2	1,322	0	8,789	4	0	6,948	2	7
Cootheraya River.	Columbum Channel and Tank	285	2¾	2,755	15	4	55	15¼	437	3	11	229	3½	2,318	11	5	44	10¾	345	7	8	184	8¾	1,973	3	9	1,664	14	11
	Sungarama Nulloor Tank	196	3¾	1,065	13	5	195	5½	1,059	15	1	0	14¼	5	14	4	0	14¼	5	14	4	0	0	0	0	0	1	12	0
	Total	481	6½	3,821	12	9	251	4¾	1,497	3	0	230	1¾	2,324	9	9	45	9	351	6	0	184	8¾	1,973	3	9	1,666	10	11
Goondul River.	Moodahully Anicut and Channel	48	9¼	327	14	7	0	0	0	0	0	48	9¼	327	14	7	13	12¼	89	13	10	34	12¼	238	0	9	58	4	7
	Thoddah Hinthovady Tank	23	3¾	192	8	6	2	10	25	2	11	17	9¾	167	5	7	15	4½	143	7	4	2	5¼	23	14	3	23	14	3
	Thoorky Channel	205	¾	1,165	9	6	5	15½	26	13	7	199	1¼	1,138	11	11	39	9½	289	9	8	159	7¾	849	2	3	849	2	3
	Polliem Tank	376	5¼	2,850	10	7	29	¼	199	8	6	347	5	2,151	2	1	35	5½	204	2	1	311	15½	1,947	0	0	1,908	10	2
	Goondul Anicut and Channel, (Thinkunhully.)	83	¼	462	3	1	0	13	6	0	4	82	3½	456	2	9	19	14¾	142	13	2	62	4¾	313	5	7	313	5	7
	Dunnagherry Tank	75	12¼	712	14	1	0	0	0	0	0	75	12¼	712	14	1	34	¼	300	1	5	41	12	412	12	8	237	7	9
	Pappencurray, do. do.	129	5¾	520	10	7	0	0	0	0	0	129	5¾	520	10	7	0	12	5	14	6	128	9¾	514	12	1	514	12	1
	Collegal Channel	510	1½	2,663	11	7	15	8¾	89	8	9	494	8¾	2,574	2	10	16	10¾	114	4	11	477	14	2,459	13	11	2,459	13	11
	Pauppenurraytank(JubthyEnaum)	641	1½	3,791	7	1	89	½	659	4	0	552	1	3,132	3	1	122	6½	647	3	10	429	10½	2,484	15	3	2,565	6	6
	Hurrovumpoorum Tank	37	15¾	116	7	4	1	12½	9	3	6	36	3¼	107	3	10	1	15¾	4	15	6	34	3½	102	4	4	102	4	4
	Muthoovanully Tank	480	2	2,868	3	8	46	11½	354	9	4	433	6½	2,513	10	4	4	15	29	8	8	428	7½	2,484	1	8	2,509	4	6
	Runganathen Tank, (Jubthy)	336	8¾	2,402	15	0	38	5¾	278	14	2	298	3	2,124	0	10	13	14¼	92	14	4	284	4¾	2,031	2	6	2,093	2	4
	Congalagherray Tank	200	12¾	1,486	1	7	28	1¼	234	7	8	172	11½	1,251	9	11	10	4½	73	4	11	162	7	1,178	5	0	1,180	5	0
	Moodoocundum Tank	84	11½	757	4	9	18	15½	170	13	10	65	12	586	6	11	8	7	72	11	8	57	5	513	11	3	515	6	5
	Humpapoorum Tank	105	3¼	526	5	8	4	15	28	8	0	100	4¼	497	13	8	19	11	37	14	2	80	9½	459	15	6	459	15	6
	Total	3,334	14¾	20,344	15	7	281	13½	2,082	14	7	3,053	1¼	18,262	1	0	357	0	2,248	11	11	2,696	1¼	16,013	5	1	15,811	3	3
Jungle Streams and Tanks.	Coimbatore — Jungle Stream	430	15¼	2,586	0	1	9	5½	53	15	3	421	9¾	2,532	0	10	299	14¼	1,544	6	10	121	11¼	987	10	0	850	15	5
	Coimbatore — Tank	191	2	1,440	7	4	12	9½	68	14	2	178	8½	1,371	9	2	91	¼	659	1	0	87	8¼	712	8	2	712	0	11
	Total	622	1¼	4,026	7	5	21	15	122	13	5	600	2¼	3,903	10	0	390	14¾	2,203	7	10	209	3½	1,700	2	2	1,563	0	4

Statement of the Nunjay Ayacut Cultivation and Revenue, &c.—(Continued.)

Jungle Streams and Tanks.

Names of Channels, &c.		Total Ayacut.					Deducted Enaum Lands.					Circar Lands.					Deducted Waste Lands.					Cultivation.							
		Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Settlement.		
Cheyoor..........	Jungle Stream.	124	13¼	982	12	0	0	0	0	0	0	124	13¼	982	12	0	3	13	32	9	11	121	¼	950	2	1	779	0	5
	Tank..........	658	2¼	5,344	7	0	45	9¼	417	3	4	612	8¾	4,927	3	8	251	3¾	1,993	8	3	361	5	2,933	11	5	2,518	11	2
	Total......	782	15½	6,327	3	0	45	9¼	417	3	4	737	6	5,909	15	8	255	¾	2,026	2	2	482	5¼	3,883	13	6	3,297	11	7
Perrindoray.....	Jungle Stream.	111	6	1,172	1	5	0	5¾	3	5	0	111	¼	1,168	12	5	42	3¼	405	0	6	68	13	763	11	11	262	0	7
	Tank..........	1,015	8½	11,025	4	9	50	6¾	612	7	6	965	1¾	10,412	13	3	326	7	3,323	7	11	638	10¾	7,089	5	4	5,215	12	5
	Total......	1,126	14½	12,197	6	2	50	12½	615	12	6	1,076	2	11,581	9	8	368	10¼	3,728	8	5	707	7¾	7,853	1	3	5,477	13	0
Kanghiem.......	Jungle Stream.	58	4¾	308	3	9	0	0	0	0	0	58	4¾	308	3	9	16	5¼	93	2	1	41	15½	215	1	8	210	2	5
Caroor..........	Jungle Stream.	441	5¼	2,900	10	11	41	8	267	9	8	399	13¼	2,633	1	3	311	12¼	2,188	7	2	88	1	444	10	1	278	6	4
	Tank..........	632	¾	4,042	12	0	19	9	123	15	6	612	7¾	3,918	12	6	313	5¼	1,897	3	10	299	2½	2,021	8	8	2,009	8	10
	Total......	1,073	6	6,943	6	11	61	1	391	9	2	1,012	5	6,551	13	9	625	1½	4,085	11	0	387	3½	2,466	2	9	2,287	15	2
Dharapoorum...	Jungle Stream.	133	10	1,318	10	5	8	10	58	12	7	125	0	1,259	13	10	22	1¾	198	3	10	102	14¼	1,061	10	0	386	15	7
	Tank..........	83	3¼	584	8	9	0	0	0	0	0	83	3¼	584	8	9	37	14½	278	6	0	45	4¾	306	2	9	302	0	8
	Total......	216	13¼	1,903	3	2	8	10	58	12	7	208	3¼	1,844	6	7	60	¼	467	9	10	148	3	1,367	12	9	689	0	3
Checkragherry.	Jungle Stream.	180	7	871	6	1	3	1	13	8	0	177	6	857	14	1	90	3¼	359	2	3	87	2¾	498	11	10	207	10	5
Danaicken-cottah..........	Jungle Stream.	1,519	9¼	13,060	5	11	42	½	339	6	9	1,477	8¾	12,720	15	2	1,197	5	10,115	15	10	280	3¾	2,604	15	4	2,494	2	4
	Tank..........	563	1¾	4,297	1	6	31	7½	225	13	6	531	10¼	4,071	4	0	231	6	1,698	13	10	300	4¼	2,372	6	2	2,161	14	1
	Total......	2,082	11	17,357	7	5	73	8	565	4	3	2,009	3	16,792	3	2	1,428	11	11,814	13	8	580	8	4,977	5	6	4,656	0	5
Suttimungalum	Talook, Tank....	796	7¾	7,129	1	7	18	2½	194	9	6	778	5¼	6,934	8	1	609	11	5,511	14	5	168	10¼	1,422	9	8	959	0	10
Andiyoor	do. Tank....	2,104	13¾	19,283	13	5	68	4	783	9	4	2,036	9¾	18,500	4	1	1,473	14¾	13,073	11	6	562	11	5,426	8	7	3,408	14	1
Collegal..........	Jungle Stream.	322	15½	3,162	15	10	0	0	0	4	0	322	15½	3,162	15	10	322	2¾	3,154	15	5	12	¾	8	0	5	3	6	3
	Tank..........	915	11	5,976	15	1	247	4½	2,008	6	5	668	6½	3,968	8	8	153	3¾	880	7	10	515	2¾	3,088	0	10	3,053	6	5
	Total......	1,238	10½	9,139	14	11	247	4½	2,008	6	5	991	6	7,131	8	6	475	6½	4,035	7	3	515	15½	3,096	1	3	3,056	12	8
Errode Talook..	Tank..........	149	12¾	1,188	2	7	0	0	0	0	0	149	12¾	1,188	2	7	119	3½	969	0	0	30	9¼	219	2	7	163	4	5
Polachee do....	Jungle Stream.	738	14¼	5,384	9	3	19	4	105	7	8	719	10¼	5,279	1	7	238	14¼	1,469	4	7	480	12	3,809	13	0	3,433	5	5
	Tank..........	587	3	3,767	13	6	17	11¼	99	11	5	569	7¾	3,668	2	1	169	11¾	810	3	5	399	12	2,857	14	8	2,490	10	4
	Total......	1,326	1¼	9,152	6	9	36	15¼	205	3	1	1,289	2	8,947	3	8	408	10	2,279	8	0	880	8	6,667	11	8	5,923	15	9
	Grand Total..	72,806	9¼	761,141	12	8	7,660	14¼	86,446	3	6	65,145	10½	674,695	9	2	13,899	2½	116,219	10	6	51,246	8	558,475	14	8	507,460	6	5

ABSTRACT.

Names of Channels, &c.	Total Ayacut.					Deducted Enaum Lands.					Circar Lands.					Deducted Waste Lands.					Cultivation.						
	Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Cawnies.		Assessment.			Settlement	
Cauvery river	3,875	6½	40,055	8	7	874	15¾	8,179	7	3	3,000	6¾	31,876	1	4	248	6¼	2,004	15	6	2,752	½	29,871	1	10	30,124	10
Bowany	16,798	13	2,26,018	15	2	1,150	13¾	21,126	13	6	15,647	15¼	204,892	1	8	1,505	10	15,433	15	6	14,142	5¼	189,458	2	2	186,076	4
Ambravutty	16,499	2¼	1,72,294	10	5	2,085	7½	23,258	14	0	14,413	10¾	149,035	12	5	865	¾	6,097	13	9	13,548	10	142,937	14	8	136,791	7
Noyel	14,276	2¾	1,65,805	0	5	1,992	9	22,248	13	1	12,283	9¾	143,556	3	4	2,787	4¾	28,521	12	8	9,496	5	115,034	6	8	83,010	1
Auliar	3,353	8¾	21,026	8	8	200	3	1,285	10	6	3,153	5¾	19,740	14	2	966	6¼	6,043	4	11	2,186	15½	13,697	9	3	13,373	
Nullaur	178	5	1,423	12	9	17	11¾	204	9	0	160	9¼	1,219	3	9	45	6	312	9	8	115	3¼	906	10	1	856	
Palaur and Tennalaur	2,249	6½	14,522	5	2	170	12½	1,185	3	0	2,078	10	13,337	2	2	756	10	4,547	14	2	1,322	0	8,7[illegible]9	4	0	6,948	
Coothooryaur	481	6½	3,821	12	9	251	4¾	1,497	3	0	230	1¾	2,324	9	9	45	9	351	6	0	184	8¼	1,973	3	9	1,666	1
Goondul	3,334	14¾	20,344	15	7	281	13½	2,082	14	7	3,053	1¼	18,262	1	0	357	0	2,248	11	11	2,696	1¼	16,013	5	1	15,811	
Jungle streams and Tanks	11,799	7¼	95,828	3	2	635	3¼	5,376	11	7	11,124	4	90,451	7	7	6,321	13½	50,657	2	5	4,802	6½	39,794	5	2	31,901	
Total	72,846	9¼	7,61,141	12	8	7,660	14¾	86,446	3	6	65,145	10½	674,695	9	2	13,899	2½	116,219	10	6	51,246	8	558,475	14	8	507,460	

S. O. E. LUDLOW,

Acting Civil Engineer 7th Division.

No. 2.

Statement descriptive of the Expenditure on important Public Works (Irrigation) and the result obtained thereby since last reported to the Board of Revenue Department of Public Works in the District of Coimbatore.

Names of works.	Disbursements in 1852.				Result.				Remarks.
	Ordinary.	Emergent.	Occasional.	Total.	Years.	Extent of Cultivation Cawnies.	Amount of Revenue.	Increase.	
1	2	3	4	5	6	7	8	9	10
Prelongation of Pullevelangal Channel in Palachy.....	93 2 7	132 5 10	0 0 0	225 12 5	Previous to work. 1256 1847	276	1,096		
					Subsequent to work. 1261.........1852	274	1,683	587	
Repair of Nunja Pogaloor Channel in Caroor...	20 4 0	0 0 0	0 0 0	20 4 0	1254.........1845	1,110	7,440		
					1261.........1852	1,120	7,698	258	
Calingarayen Anicut and Channel in Errode	4,043 1 8	41 4 3	1,225 7 5	5,311 13 4	1254.........1845	3,012	81,539		
					1261.........1852	3,386	86,883	5,344	
Do. of Palloor Tamoey Tanks and Coomapally Channel in Caroor.	310 12 11	[illegible]	[illegible]	639 8 [illegible]	1254.........1845	1,637	14,856		
					1261.........1852	1,640	14,916	60	
	[illegible] 2	173 11 [illegible]	1,2[illegible] 2 6	6,[illegible] 7 [illegible]				6,249	

Coimbatore,
19th April, 185[illegible].

Errors Excepted Per
E. B. THOMAS
Collector.

No. 3.

Statement shewing the Expenditure on Important Public Roads in the District of Coimbatore with the result obtained thereby so far as can be ascertained in 1852.

Name of Talook.	Name of Road.	Disbursements.									Balance of Estimate.			Amount required to complete the Work.			Amount of Export, Import and Home Trade.				Probable period for completion.	Remarks.
		Up to end of 1851.			In 1852.			Total.									In 1851.	In 1852.	Comparison.			
																			Increase.	Decrease		
1	2	3			4			5			6			7			8	9	10	11	12	13
Palachey	Palghaut road—from Palachey to the limits of Cochin 9¾ miles as far as Mungamaday				1,781	4	4	1,781	4	4	679	11	8				57,451	57,629	178		April 1854.	
Do.	Do. constructing a bridge over the Ootoocooly Jungle stream	100	0	0	139	0	0	239	0	0	890	12	0								December 1853.	
Danaickencottah	Repair of Guzzlehutty ghaut—Mysore road	762	5	5	213	7	9	975	13	2	24	2	10				2,08,287	1,21,604		86,683	Do.	
Coimbatore	Constructing a bridge over the Sunganoor stream on the Metapolliam road	2,118	10	10	714	4	10	2,827	15	8	1,370	1	4	600	0	0	37,457	18,840		18,617	April 1854.	
Palladum	Constructing a do. of 3 arches over the Noyel river on the Trichinopoly road				774	6	10	774	6	10	3,738	3	2				5,73,230	5,98,701	25,471		August 1854.	
	Repairing road from Shooloor to Cundien Covil do				1,096	1	7	1,096	1	7	3,714	2	5								December 1853.	
Kengyem	Do. from Coimbatore to Kengyem				276	10	9	276	10	9	106	15	3								Do.	
Repairing Trunk	Road from Walliar to Bhowany				3,017	0	2	3,017	0	2	3,981	8	1				12,84,205	14,38,698	1,54,493		December 1853.	
	Constructing bridges on the do.				711	5	6	711	5	6	3,504	10	0									
	Total	2,976	0	3	8,723	0	9	11,699	10	0	18,010	2	9	600	0	0	21,60,330	22,35,472	1,80,142	1,05,300		

Net Increase.............. 74,842

Coimbatore,
19*th April*, 1854.

Errors Excepted per

E. B. THOMAS,
Collector.

REPORT ON THE MORE IMPORTANT WORKS EXECUTED OR IN PROGRESS DURING THE YEAR 1852 IN No. 8 DIVISION.

During the year under review, a considerable number of new works and repairs to old ones were undertaken in the 2 districts forming No. 8 division, but more particularly in Tinnevelly. In the latter district the principal works connected with irrigation completed on occasional estimates were as follows,

	Amount of estimate.		Performed in 1852.		In previous years.		Total expenditure.	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.
Mailacaul from the Murdoor anicut...	5,228	4	1,113	7	3,792	7	4,905	14
Soondrapandiem Pereacolum........	1,858	0	1,186	3	671	13	1,858	0
Arcanoygapoorum Vunnancolum.....	882	0	882	0	0	0	882	0
Wattrairoopoo Punnekancolum...	907	3	896	9	0	0	896	9
Mailagarum Velvelootheccolum	479	15	479	15	0	0	479	15
Coonagoody channel...	516	14	516	14	0	0	516	14

The first mentioned work was remarked upon in my report for 1851, and the benefit resulting from it was there shewn to be considerable. During the year 1852, the improvements to the Mailacaul channel were continued at my suggestion for a further distance of 1 mile, 0 furlong, 22 yards, from the balance remaining from the sanctioned estimate. This channel has now been cleared of rock and widened to an uniform width at bottom of 14 yards from its head to a distance of 8 miles 4 furlongs, 119 yards. There still remain about 4 miles of channel requiring similar treatment, but as there are other works in the same talook (Streevigoontum) of more immediate importance, the further improvement of this channel is postponed until after their completion. The rough stone revetment to Soondrapandiem Pereacolum in the Thencausee talook, was completed in 1852 at the estimated cost, viz. Rupees 1,858. The object of this expenditure was to enable the tank to hold sufficient water for căr, or early crop, during the prevalence of the South-west Monsoon, which it could not do previously in consequence of the violence of the waves. The tank is now in excellent order, and I should hope would eventually yield a good return for the outlay upon it. Up to the present time, however, the Meerassadars have not kept to their agreement of cultivating căr. The two next items were for raising and widening the bunds of Vunnancolum and Punnekancolum tanks, and restoring the masonry works therein to an efficient state. The outlay on Velveloothecolum, as above, includes the cost of constructing a rough stone revetment to the bund and widening the same to 3 yards, to afford room for carts to pass. The last item was for a surplus Calingulah in the Coonagoody channel, to prevent breaches and consequent loss of valuable water.

The principal works of irrigation which were only partly executed in 1852 on occasional estimates were as follows, viz.

	Amount of estimates.		Performed in 1852.		In previous years.		Remaining.	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.
Vunddacaul branch of the Keelacaul from the Murdoor anicut.	4,914	0	3,460	6	0	0	1,453	11
Sevala Keelacolum.	1,898	13	515	15	713	6	669	8
Streevenkatasapoorum Pereacolum.	670	15	254	8	190	6	226	1

The first named work was recommended by me as a substitute for the "Thencaul," which formerly supplied the Streevigoontum Pereacolum and other tanks to the eastward. The declivity of the bed of the "Thencaul" was so great, that by the time the channel had reached the supply sluice of Pereacolum, its level was far below that of the ordinary water mark of the tank, and the consequence was that during freshes the current was checked, and a great quantity of water flowed back into the river again, which ought to have passed on to the tanks to the eastward. The head of the former "Thencaul" was closed, and the Vuddacaul branch widened to 14 yards, to afford room for the whole of the water of the main channel to pass down it. The several works connected with this project were sufficiently for advanced in 1852, to admit of the Vuddacaul being brought into use for the supply of Streevigoontum Pereacolum and other tanks to the eastward. The result was highly satisfactory. The Awroomoogamungalum tank, the last in the series, and situated at a distance of 22½ miles from the Murdoor anicut, received a full supply of water for its cār crop during the early freshes in the Tambrapoorney River, and cultivated to the extent of 797 acres, yielding a revenue to Government of Rupees 6,420–6–9, which is Rupees 2203 in excess of the average of the 10 years immediately preceding Fusly 1262, or nearly half the proposed outlay. The remaining work it was expected would be completed in 1853 at the estimated cost, or thereabouts. The revetment to the bund of Sevala Keelacolum, commenced in 1851, was not completed even in 1852. Rupees 669–8 worth of work remained to be carried into effect in

1853. This outlay was not recommended with a view to increase in revenue, but simply to restore the bund to an efficient state, which it has done. The repairs and improvements to Venkatasapoorum Pereacolum tank and channel, were only partially executed during the year under review. The remainder were completed in the following year. In the Madura District, the works of irrigation constructed on occasional estimates in 1852, consisted chiefly of new Calingulahs and sluices to tanks, and the items were individually of small amount.

Under the head of "Ordinary," the expenditure for the repair of works of irrigation in 1852, was considerable. In Madura the principal work was the Nellyoor channel, the bed of which was widened and deepened on an estimate of Rupees 5,257–3. The amount of work executed during the year was valued at Rupees 4,271–10. This channel is taken off the Vigay River and supplies the Nellyoor Pereacolum, besides a large extent of land between the river and tank of considerable value to Government, the revenue in Fusly 1260 being Rupees 24,715. The efficiency of the channel has been greatly improved by the above outlay. The Kalayempoothoor anicut on the Shunmooganuddee, in the Iyempully Talook, was repaired at an outlay of Rupees 828–2, and two other similar works, the Chittanai on the Vigay River and the Corayoor anicut on the Goundelnuddee, had also outlays upon them to the amount of Rupees 483–3, and Rupees 612–7 respectively. The bund of the Chowdarputty Tank in the Thiroomungalum Talook, was raised and widened at a cost of Rupees 629–3, and that of Vunnamputty Tank in the Nellacotta Talook, including repairs to the supplying channel and surplus Calingulah, at Rupees 487–13. In the Tinnevelly district the principal items for ordinary repairs to irrigation works were as follows.

	Amount of Estimate		Performed in 1852.		
Velloor Pereacolum........	7,825	0	1,139	3	Incomplete
Thenecurray do.	9,220	5	1,548	3	do.
Keelacaul from the Murdoor Anicut	3,693	7	1,388	5	do.
Vaulacolum Pereacolum...	1,527	15	1,527	15	Completed.
Munjumbooly Anicut......	1,290	4	1,217	15	do.
Arasaputtoo Channel.......	812	4	812	4	do.
Vahacolum Tank.	934	15	831	12	do.
Maitoocaul Channel.	822	2	753	12	Incomplete.
Cunnadien Channel.	774	15	774	15	Completed.

The total expenditure for works of irrigation in Madura and Tinnevelly, during the year 1852 was as follows,

	Ordinary.	Emergent.	Occasional.	Total.
	Rs.	Rs.	Rs.	Rs.
Madura	22,283	1,266	1,723	25,272
Tinnevelly	49,087	1,637	15,933	66,658
Total in No. 8 Division...	71,370	2,903	17,656	91,930

In my Report for 1851, I gave the average revenue from wet cultivation in the districts of Madura and Dindigul for 15 years ending Fusly 1261, and shewed that the increase in the last 5 over the first 5 years amounted to Rupees 3,60,962. It is satisfactory to find that the revenue of Fusly 1262 in Madura was second only to that of 1257, the highest year on record, and that that of Tinnevelly is exceeded only by the collections of Fuslies 1255, 1256 and 1857; while the total for the 2 districts is considerably above the average for the previous 5 years, as will be seen by the subjoined statement.

	Average from Fusly 1257 to 1261.		Fusly 1262.	
	Acres.	Rupees.	Acres.	Rupees.
Madura.......	1,05,971¾	4,68,516	1,08,327	5,14,129
Tinnevelly....	1,76,178¼	12,67,719	1,41,832	12,71,999
Totals....	2,82,150	17,36,235	2,50,159	17,86,128

I may here remark by way of explanation that the apparent decrease in cultivation in Fusly 1262 in the district of Tinnevelly, below that of the 5 years average ending Fusly 1261, is owing to the omission of what is termed "Thalady", or one crop land cultivated with two crops. Hitherto the extent of land cultivated with a second crop has been added to the first crop. It is now omitted by order of the Board of Revenue. The increase in cultivation, however, must have been considerable, for the average rate per Cotay of Mailwarum grain for the 5 years ending Fusly 1261 was Rupees 2–10–11¾, while in Fusly 1262 it was only Rupees 2–7–6½, a fall of Annas 3 Pice 5¼ per Cotay, and still there was an increase in revenue of Rupees 4,280.

The Board have directed that some account should be given of the more important works previously executed. I will, therefore, first refer to some of those entered in the printed list of special, and other works of Irrigation performed in the Madras Presidency from 1836 to 1849. The first work connected with this division is the Chittanai, across the Vigay river in Madura. It is shewn in the list that the highest cultivation and revenue from this work, since the influence of the outlay in 1839-40 was felt, was in Fusly 1254, the cultivation that year being 1645 acres, and the revenue Rupees 9,822. This extent of cultivation and revenue has been exceeded in several subsequent Fuslies, and had it not been for a failure of the crops in Fusly 1261, when the revenue fell to Rupees 6,264, the average of the last 5 Fuslies, or from 1258 to 62, would have shewn a very considerable increase. Even taking this bad year into the account, the average of the 5 years falls very little short of 1254, as will be seen below, while the cultivation and revenue last Fusly, or 1262, exceeded it greatly.

	Cultivation.	
	Acres.	Rupees.
Fusly 1,254..................	1,645	9,822
Average of 5 years from Fusly 1258 to 62.......	1,634	9,636
Fusly 1,262	1,879	11,685

The expenditure on the Anicut in question, in the years 1851 and 52, amounted in the aggregate to Rupees 750-10. There was no outlay upon the tank or channel in these years. They are in good order at the present time, but the anicut needs partial repair, which has been estimated for this year at Rupees 699-5. The next work in the list is the Adachany channel in Tinnevelly. This work is in good repair at present, and continues to render a very profitable return to Government for the original outlay upon it. The highest cultivation and revenue given in the list are acres 509 Fusly 1258, Rupees 3323 Fusly 1257. That of Fusly 1260 exceeded this by 13¼ acres, but owing to the rate per cotay of Mailwarum grain, being considerably lower in that year than it was in Fusly 1257, the revenue fell slightly short of the above amount, it being Rupees 3,070. In 1852 the anicut supplying this channel had a rear apron added to it, at an expense of Rupees 600, and the channel itself had a small outlay upon it of Rupees 79-5. The gross increase to Government from this work, after deducting first cost and all repairs up to 1852, is Rupees 7,428, while the annual per centage on first cost is 24⅝. The cultivation under Valathacolum tank was in Fusly 1260 nearly equal to the highest in the list, but the following Fusly there was almost an entire failure for want of rain. In Fusly 1262, however, there was a very considerable increase in both cultivation and revenue, the former being acres 177 and the latter Rupees 983. The gross increase upon this work is Rupees 315, and annual per centage on first cost 20⅛. Another work mentioned in the printed list is "Autoor tank improvements," and its highest revenue since the influence of the work was felt, is given at Rupees 15,949 in Fusly 1255. The extent of cultivation in the same Fusly not being given in the list, a comparison cannot be made with Fusly 1262, but I have no doubt the latter exceeded the former, inasmuch as with a decrease in the rate per cotay, the revenue derived in 1262 from the tank alone was Rupees 15,575. I am not aware whether the revenue from the channel is included in the amount entered in the printed list, but if it is, the revenue of Fusly 1262 would exceed it considerably, as will be seen by the marginal Statement. The expenditure in the years 1851 and 1852 amounted to Rupees 530-3 for the channel, and Rupees 552-1 for the tank. The works are in an efficient state at the present time. I have not obtained the accounts for the other works mentioned in the list, but I have no doubt that with the exception of those in the Vulleyoor and Nangoonairy talooks of Tinnevelly, where there was a great want of rain in Fuslies 1260 and 1261, the result has been on the whole satisfactory. There are several other works, however, in the districts of Madura and Tinnevelly executed from 1837 to 1852, which have not hitherto been brought to the notice of the Board, and of which I have prepared a list drawn out in the same form as that above referred to. In some of the works it will be seen that there has been a decrease instead of an increase in revenue since the first outlay. The cause of this is to be found in the almost total failure of rain in the Vulleyoor talook of Tinnevelly in Fuslies 1260 and 1261. In Fusly 1262 there was a considerable increase in the cultivation and revenue under each of the three tanks in the above talook, as will be seen by the marginal Statement, and provided there is the usual fall of rain in the talook, I have no doubt they will continue to cultivate above the former average.

	Fusly 1261.		Fusly 1262.	
	Acres.	Rs.	Acres.	Rs.
Tank...	2,574	14,908	2,744	15,574
Channel	334	1,871	347	1,923
	2,908	16,779	3,091	17,497

	Cultivation and Revenue before the influence of work felt.	
	Acres.	Rs.
Padaliarcolum........	311	2,376
Rathapoorum Nedoongolum.	29	265
Peroongoody Dullavoycolum	104	630

Cultivation and Revenue in Fusly 1262.		Increase.	
Acres.	Rs.	Acres.	Rs.
357 ...	2,651	46 ...	275
55 ...	414	26 ...	149
157 ..	862	43 ...	232

In Thámaracolum Peracolum there has been an increase in the extent of land cultivated, but a falling off in the revenue, owing to a reduction in the rate per cotay of Mailwarum grain. There is one work in Madura also, viz. the Nellyoor channel, which exhibits a decrease in revenue. This is entirely owing to a failure of the crops in Fusly 1261 for want of the usual fall of rain at the proper season. The loss in this one year amounted to Rupees 10,579, which entirely neutralizes the gain in Fuslies 1260 and 1262, which is shewn to have been Rupees 8,720. Taking all the works together, the gross profit to Government has been Rupees 1,18,192, and the average annual per centage of net increase upon the first outlay of Rupees 33,963 is $42\frac{5}{16}$.

Roads and Bridges.

In my report for 1851 I stated that certain repairs and improvements to

Road No. 4 from Madura to Palamcotta and Travancore, via the Arambooly lines, were completed with the exception of the gravelling over broken stone in the limits of Elloopaoorncy and Nully, in the Sautoor Tank. This work was carried into effect in 1852 at an expense of Rupees 2,221, making, with previous expenditure in the above limits, a total of Rupees 9,166. The length of road made on this outlay was miles 5, furlongs 4, yards 86, and therein are included 2 bridges, one of 3 arches across the Elloopaoorney Oday and the other of 2 arches across the suppylying channel of Nully talook. In 1852 a further portion of the same road to the north of, and in continuation of the above was put in hand on an estimate of Rupees 9,090-3. The expenditure during that year amounted to Rupees 6,338-11, spread over a distance of miles 3 furlong 1 yards 30, the subsoil being " black cotton." South of Palamcotta, on the same road, 3 stone platform tunnels and a stone pavement were constructed at an expense of Rupees 306-2, and a further sum of Rupees 324-2 remained from the sanctioned estimate to pay for carting gravel to the road, which was done in 1853. Two separate portions of this road underwent ordinary repairs in 1852, one portion of miles 5 furlong 1 yards 30, from Virdooputty to the Northern boundary with the Madura district, and another of miles 5 furlongs 2 yards 40, from Soolochonum's bridge at Palamcotta to Shady Khan's choultry, the former at an expense of Rupees 1,934, and the latter at Rupees 785-4. The several parts of this road which have been made of late years on estimate, are now in good working order, and it will not be long, I hope, before the remainder of the black soil between Palamcotta and Madura is metalled. A further portion of it, measuring 3 miles 7 furlongs 190 yards, in continuation of that last made, is under execution at the present time on an estimate of Rupees 9,956-1. This will carry on the made road as far as Sautoor, beyond which, for a distance of 2 miles, 1 furlong, 160 yards, the road has been made partly by village labour and partly from the Cotton road estimate. There remain, therefore, to be made on estimate 10¾ miles of black Cotton soil, and 1 mile 3½ furlongs of red soil. Since the report for 1851 was sent in, Government has sanctioned the estimates for bridges referred to therein, as required over the principal rivers and streams on this road. They are five in number, and the aggregate estimated cost is Rupees 55,150-1-0.

During the year 1852, the remaining tunnels and pavements on road No. 12, provided for in the estimate of Rupees 1,096-14, sanctioned by Government on the 18th February 1851, were completed at a cost of Rupees 583, making with the previous year's expenditure a total of Rupees 1,096-12. The repairs to Aroomanairy salt road (a branch of No. 12) commenced in 1851, were completed in 1852, the total expenditure for the same being Rupees 671-8. In the latter year a further sum of Rupees 734-9, raised by subscription among the native community, was laid out in raising and gravelling portions of road No. 12. This road, next to road No. 4, is perhaps the most frequented one in Tinnevelly, communicating as it does with the ports of Coilputnum and Coolasagraputnum, and the salt pans at the latter place and Aroomanairy. It has been very much improved of late years, but there are parts of it which require further' outlay for gravelling, and for which an estimate will be shortly submitted. The paved cause-way across the Cadumba tank surplus, spoken of in my report for 1851, is under construction at the present time on an estimate of Rupees 1,687, sanctioned by Government on the 8th June 1853.

Trunk Cotton [illegible]oad.

The portion of this road lying between Shevacausee and Sautoor, which was commenced in 1850 and continued in 1851 under Captain Boswell's superintendence, was completed in 1852 under that of Captain Hickley of the 15th Regiment N. I. at a cost of Rupees 2,735–15, which added to the expenditure in the above two years, gives a total of Rupees 17,137–10 for the whole distance, viz. 9 miles, 6 furlongs, 60 yards. In this is included Rupees 4,753–11 for the Venkatasapoorum bridge, mentioned in the report for 1851, the parapets and plastering to which were completed in 1852 at an expense of Rupees 533–5. Another portion of this road, viz. that from Streevellahoothoor to Shevacausee, was commenced in October 1852 under the superintendence of Lieutenant Helbert of the 5th Regiment L. C., and by the end of December a distance of 1 mile, 5 furlongs, 147 yards was in part constructed on an outlay of Rupees 1,170–5.

Cross Cotton Road.

This road connects Road No. 4 with the trunk road at Ettiapoorum. The distance from one to the other is 8¾ miles, and the amount sanctioned for it Rupees 16,763–3. Captain Hickley commenced work on this road on 3d March 1852, and by the end of the same year 6 miles, 4 furlongs, 162 yards were completed, and the remainder under progress; the expenditure for the year being Rupees 11,086–8. A very large portion of the above distance is over black cotton soil, requiring broken stone and gravel. The number of small bridges, tunnels and pavements was also very considerable. This road was completed in 1853 and stood the heavy rains of October and November last remarkably well, no injury whatever having happened to it.

Branch Cotton Road.

This road, as mentioned in my report for 1851, is partly in Ramnad, belonging to Madura, and partly in Tinnevelly. Of the Ramnad portion, a further distance of 5 miles 1 furlong 140 yards to the southern limit of Punthalagoody was completed, with the exception of a bridge of

3 arches across the Setharajapoorum Oday, which was delayed for want of bricks. The expenditure in the year under review was Rupees 11,243–5, or for the total distance of 10 miles 1 furlong 140 yards made in 1851 and 52, Rupees 20,430–3 on an estimate of Rupees 28,329–2. The work was under the superintedence of Ensign Lawford for the first 3½ months in the year, and for the remainder under that of Captain Hickley. The latter Officer also completed 2 miles 2 furlongs 215 yards of the same road in the Tinnevelly district during the year 1852, and expended thereon Rupees 3,400–12. The estimate for the Tinnevelly portion amounts to Rupees 44,975.

In the Madura and Dindigul districts the repairs to road No. 2, mentioned in my report for 1851 as then under progress, were completed in the following year at a further cost of Rupees 154–10, making a total of Rupees 4,568–4. Road No. 15, had a further outlay of Rupees 2,414 upon it in 1852, but there still remained a balance of Rupees 2,810 to complete the repairs and improvements allowed for in the sanctioned estimate. In addition to the above, a small extent of road No. 23, was made on an estimate of Rupees 1,405–7, sanctioned on the 7th September 1849. The total expenditure up to the end of December 1852 was Rupees 1,320–4 and the length of road made or improved was 2 miles 3 furlongs, 200 yards. This road serves to connect the richly cultivated valley of Dindigul with the cotton growing talooks of Streevellapoothoor and Sautoor in Tinnevelly. Large quantities of paddy are exported from the former to the latter, and it is highly desirable it should be put in good order throughout. Estimates for the repair and improvement of this road, as also that of road No. 13, the principal salt road in the Madura district, will shortly be submitted for sanction. It is also in contemplation to solicit sanction for the necessary outlay for constructing a new road to connect Palamcotta with the Port of Tuticorin. The present road for the greater part of the way is nothing more than a bandy track, and is crossed by several large streams, which are often not fordable for hours and even days together. Of the total distance viz. 31 miles 5 furlongs 91 yards, no less than 17 miles 3 furlongs 91 yards are over black cotton soil, to metal which would cost a large sum. The proposed line is to the South of the above, and has only 5¾ miles of cotton soil. The cost has been roughly estimated at Rupees 35,000.

During the year 1852 two very useful bridges were constructed in the district of Tinnevelly by subscription among the native community. One of these was a bridge of 5 arches, 4 of 50 feet and 1 of 52 feet span, across the Chittaur river on road No. 2, together with a subsidiary arch of 30 feet across an irrigating channel from the same river to the south of the above. The estimate amounted to Rupees 10,708–4, and the cost of the work performed in

1852 was Rupees 7,645–4. The parapets, plastering, and approaches were completed in 1853, and the total cost up to the 7th June 1853 was Rupees 9,458–10. The other work was a platform bridge of 5 vents, each 9 feet wide by 16 feet in height, across the Hurrechurranuddee on road No. 9, in the vicinity of the Cusbah of Theneausee talook. The cost of this bridge, including that of a small additional bridge across the Coonagoody channel on the eastern approach to the large one, was Rupees 2,204–11. This bridge with the new line of road to it, which has been opened without expense to Government, serves to connect the large town of Shencotta in Travancore with that of Theneausee in Tinnevelly, and is in every respect a very useful work.

The principal items of expenditure in 1852 on account of public buildings in Madura and Tinnevelly were as follows.

	Amount of estimate.		Amount expended in 1852.		Amount expended in 1851.		Total expenditure.		
Madura.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	
Head Asst. Collector's Cutcherry at Madura	1,209	14	900	3	309	11	1,209	14	Completed,
Traveller's Bungalow at Palkanooth on road No. 2	339	3	300	3	0	0	300	3	do.
Verandah and additional Record room to the Toddicombu Talook Cutcherry	346	4	346	4	0	0	346	4	do.
Tinnevelly.									
Additional Record room to the Veedoogramum Talook Cutcherry.....	370	10	317	14	0	0	347	14	do.
Do. do. to Bremadasum do.	370	10	332	7	0	0	332	7	do.
Do. Treasure room to Huzzoor Treasury and repairs to the same building..................	366	2	366	2	0	0	366	2	do
New Talook Cucherrry at Naugoonairy........	2,787	15	2,072	11	0	0	2,072	11	Incomplete.
Do. do. at Sunkerninarcoil.	2,787	15	2,656	10	0	0	2,656	10	do.
Do. do. at Ootapedarum...	3,099	9	1,528	6	0	0	1,528	6	do.
Total Ruqees......	11,678	2	8,850	12	309	11	9,169	7	

In addition to the above a Lungur Khana for the accommodation of Brahmins and Soodras was in part constructed at Palamcotta in 1852. It was estimated to cost about Rupees 4,000, and the whole of this sum, as also a monthly subscription for its support, amounting to about Rupees 200, was subscribed by the native community of the district.

During the year under review the Civil Engineer Department in this division was much weakened by the removal of the 1st Assistant Lieutenant P. O'Connell to the 6th Division. He quitted the division on the 27th

March having been absent previously for 20 days on leave to the Neilgherries, and the division remained without an assistant for the remainder of the year. The two Assistant Surveyors were employed, one in Madura and the other in Tinnevelly, in examining works in progress and in estimating for the repair of such as required it. Assistant Surveyor McNair was absent from the division during the whole of the month of January and 19 days in February on leave to the Neilgherries. Assistant Overseer Bywater was engaged in superintending the repairs to Road No. 15, and the works in progress in the town of Madura. Assistant Overseer Smither joined the division on the 1st December and the remainder of the month was occupied in marching to Tinnevelly. A statement shewing the number and cost of works inspected, or the amount expended under the superintendence of each member of the department is annexed to this report. Also a general statement of the expenditure on Public Works classified for the ten preceding years, and two other statements, one shewing the cost of the Civil Engineer's Establishment, omitting Military pay, and the other that of the Collector's Maramut Establishment for the same period.

W. H. HORSLEY, CAPTAIN,
Civil Engineer 8th Division.

Civil Engineer's Office, 8th Division,
Veerapandienputnum, 31*st March* 1854.

List of special and other Works of Irrigation performed in No. 8th Division, from 1837 to 1852.

District.	Talook.	No.	Name of Work.	Amount of first expenditure and year or years in which incurred.	Cultivation and Revenue before influence of work felt.		Highest Cultivation and Revenue since influence of work felt.		Aggregate increase of Revenue derived since influence of work felt.	Aggregate decrease of Revenue since influence of work felt.	Net.		Cost of repairs, &c. since first outlay.	Difference between Columns 10 & 12 or		Average annual net.		Annual per centage on first cost or Column 3.		Total of first cost and repairs or Columns 3 and 12.
					Cultivation in Acres.	Revenue.	Cultivation in Acres.	Revenue.			Increase.	Decrease.		Net increase after deducting repairs.	Net decrease after deducting Col. 10 from repairs or adding them to Col. 11.	Increase.	Decrease.	Increase.	Decrease.	
1			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Madura.	Maudacolum	1	Nellayoor channel	1849–50 732	3,764	20,072	1260 4,024	24,715	In 3 years 8,720	In 1 year 10,579	....	1,859	4,272	....	6,131	....	1,533	....	209$\frac{1}{16}$	5,004
	Thenkurray......	2	Coonoor anicut and channel	1847–48 1,975	366	696	1258 142	958	In 4 years 980	In 1 year 223	757	....	....	757	....	151	....	7$\frac{3}{8}$	....	1,975
		3	Gooleanoor anicut	1847–48 978	127	336	1260 159	495	In 5 years 363	....	363	....	....	363	....	73	....	7$\frac{3}{8}$	....	978
	Iyempully	4	Vyapoory tank	1849 495	539	4,480	1261 553	1260 4,668	In 3 years 348	....	348	....	153	195	....	65	....	13$\frac{1}{8}$	....	648
Tinnevelly.	Vulleyoor	5	Vulleyoor new tank	1837–38 4,862	....	....	1259 574	3,100	In 13 years 18,254	....	18,254	....	1,026	17,228	....	1,149	....	23$\frac{5}{8}$	....	5,888
		6	Padaliarcolum	1849 2,051	311	2,376	1261 358	1262 2,651	In 2 years 508	In 1 year 1,628	....	1,120	296	....	1,416	....	472	....	23	2,347
		7	Rathapoorum Nedooncolum	1849 1,114	29	265	1262 55	414	In 1 year 149	In 2 years 530	....	381	....	....	381	....	127	....	11$\frac{3}{8}$	1,114
		8	Peroongoody Dalavoyeolum	1849 1,288	104	630	1262 157	862	In 1 year 233	In 2 years 1,256	....	1,023	....	....	1,023	....	341	....	26$\frac{7}{16}$	1,288
		9	Sautancolum	1850 959	14	105	1262 87	468	In 2 years 452	....	452	....	....	452	....	226	....	23$\frac{9}{16}$	....	959
	Nangoonary......	10	Thamaracolum Peracolum	1848 985	523	6,586	1262 548	1261 6,228	....	In 4 years 3,381	....	3,381	....	....	3,381	....	845	....	85$\frac{13}{16}$	985
		11	Caroombandeyammen channel	1839 to 43 6,655	5,281	52,034	1262 8,228	1257 73,454	In 10 years 1,09,832	In 1 year 10,074	99,758	....	683	99,075	....	9,007	....	135$\frac{5}{16}$	....	7,338
		12	Nangoonary Peracolum	1844 & 46 2,360	1,468	9,474	1259 2,245	1257 16,581	In 7 years 34,967	In 1 year 2,070	32,897	....	1,087	31,810	....	3,976	....	168$\frac{1}{16}$	....	3,447
	Thencausy	13	Pautcoorchy Mailacolum	1847–48 856	158	863	1258 224	1,518	In 5 years 1,817	....	1,817	....	55	1,762	....	352	....	41$\frac{1}{8}$	....	911
		14	Do. Keelacolum	1847–48 1,284	219	1,121	1259 249	1258 1,687	In 5 years 2,250	....	2,250	....	....	2,250	....	450	....	35$\frac{1}{16}$	....	1,284
				1847–48			1261		In 5 years											

Statement shewing the amount expended on Public Works in No. 8th Division during the year 1852.

	Madura.			Tinnevelly.			Total.			Remarks.
	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	
Works of Irrigation.										
Ordinary	22,283	6	0	49,087	6	0	71,370	12	0	
Extraordinary	1,266	2	0	1,637	3	6	2,903	5	6	
Occasional	1,723	6	0	15,933	9	10	17,656	15	10	
Works not of Irrigation.										
Roads and Bridges	12,854	3	0	41,554	14	1	54,409	1	1	
Civil Buildings	2,811	6	0	3,849	9	10	6,660	15	10	
Chuttrums	0	0	0	0	0	0	0	0	0	
Military Buildings	0	0	0	0	0	0	0	0	0	
				Grand Total			1,53,001	2	3	

Civil Engineer's Office, 8th Division,
Veerapaundien Putnum,
31*st March*, 1854.

W. H. HORSLEY, CAPTAIN,
Civil Engineer 8th Division.

Statement shewing the number of Officers, &c. employed in No. 8th Division, during the year 1852, the number of works examined or superintended and the amount of salary drawn by each individual.

Name of Officers, &c.	Designation.	No. of days employed in the division.	Works examined.				Works estimated.				Amount of Salary.			Per Centage on the works examined or superintended by each Officer or Surveyor.		
			No.	Amount.			No.	Amount.								
Captain W. H. Horsley,	Civil Engineer,	333	167	121,634	10	8	95	40,610	13	0	9,728	0	0	7	15	$11\frac{3}{16}$
Lieutenant P. O'Connell,	1st Assistant do.	70	25	8,116	2	0	50	30,851	11	0	744	2	5	9	2	$8\frac{1}{16}$
Mr. F. Mason,	Assistant Surveyor,	366	215	40,390	0	0	68	23,768	3	0	2,108	11	4	5	3	$6\frac{9}{16}$
Mr. D. McNair,	do. do.	316	192	36,055	3	9	67	22,388	6	0	1,565	10	4	4	5	$5\frac{3}{8}$
2d Corporal W. H. Bywater,	do. Overseer,	366	2	3,472	4	2	0	......	...	...	527	5	0	15	2	$10\frac{1}{16}$
Gunner T. Smither,	do. do.	31	0	0	0	0	0	......	...	...	43	15	1	0	0	0
Captain W. H. Boswell,	Superintendent Trunk Cotton Road.	29	1	595	15	6	0	......	...	...	180	8	9	30	5	$10\frac{7}{8}$
Captain M. Hickley,		62	1	2,139	15	9	0	......	...	...	392	7	3	18	5	1
do. do.	do. Cross Cotton Road,	275	1	12,264	4	0	0	......	...	...	1,725	0	0	14	1	$0\frac{7}{16}$
do. do.	do. Branch Cotton Road,	250	1	9,105	0	0	0	......	...	...	816	10	7	8	15	$6\frac{3}{4}$
Ensign Lawford,		114	1	6,370	2	2	0	......	...	...	718	10	8	11	4	$7\frac{3}{16}$
Lieutenant Helbert,	do. Streevelly Poothoor Trunk Cotton Road,	66	1	706	1	0	0	......	...	...	414	10	8	58	12	$6\frac{1}{8}$
Lieutenant G. Paxton,		47	1	417	11	0	0	......	...	...	294	5	4	70	5	$11\frac{11}{16}$

Civil Engineer's Office,
8th Division,
Veerapaundien Putnum,
31st *March*, 1854.

W. H. HORSLEY, CAPTAIN,
Civil Engineer 8th Division.

Statement shewing the amount expended on Public Works in No. 8th Division, during the 10 years ending with 1851.

Years.	Madura.						Tinnevelly.																		Total.		
	Works of Irrigation.				Roads & bridges.	Civil Buildings.	Works of Irrigation.												Roads & bridges.			Civil Buildings.					
	Ordinary.	Emergent.	Occasional.	Total.			Ordinary.			Emergent.			Occasional.			Total.											
1842.	16,758	1,101	3,154	21,013	16,044	0	32,603	0	0	6.458	2	0	5.251	3	1	44.312	5	1	3.993	0	6	95	7	0	85,457	12	7
1843............	5,584	172	183	5,939	2,231	0	33,329	7	0	2,540	2	0	2,149	10	0	38,019	3	0	4,867	12	4	545	12	0	51,602	11	4
1844..	13,038	354	1,462	14,854	6,513	406	38,993	1	0	836	9	5	4,030	6	0	43,860	0	5	11,820	0	0	336	2	3	77.789	2	8
1845............	15,357	6,023	1.940	23,320	4,750	2,077	27,830	6	0	2.208	12	7	566	11	0	30.605	13	7	4.020	15	5	2,332	6	11	67,146	3	11
1846,...........	24,277	996	3,859	29.132	13,868	702	36.452	3	0	1,607	4	9	8,925	2	7	46.984	10	4	10,654	14	0	1,658	7	1	1,02.999	15	5
1847............	7,282	2,104	4,250	13,636	12,691	1.826	41.038	6	0	6,858	13	10	11,763	11	11	59,660	15	9	4.549	10	9	3.945	4	11	96,308	15	5
1848............	24.277	982	5,556	30,815	8,415	7,264	66.857	8	0	3,378	8	9	15.083	3	0	83,139	3	9	6,765	12	10	3,449	0	5	1,42,028	1	0
1849......	27,328	311	3,985	31,624	11,052	1,587	51,179	7	0	2,113	2	3	13,662	2	0	66.954	11	3	11.955	11	4	9,787	15	11	1,32,961	6	6
1850............	22,439	2,072	1,425	25,936	3,047	1,419	52.012	14	0	1,760	4	0	7,764	14	0	61,538	0	0	5,023	3	9	1,840	14	11	98,804	2	8
1851.........,..	30,625	2,653	1,842	35,120	13.978	2.863	40,663	15	0	1,802	10	8	10.006	3	0	52,472	12	8	21,254	8	6	15,782	7	5	1,41,472	12	7
Grand Total...	1,86,965	16,768	27,656	2,31,389	92,589	18,146	4,20,950	3	0	29.564	6	3	79,203	2	7	5,29,727	4	10	84.905	9	5	39,773	14	10	9.96,531	4	1

Civil Engineer's Office, 8th Division,
Veerapaundien Putnum,
31*st March*, 1854.

W. H. HORSLEY, CAPTAIN,
Civil Engineer 8th Division.

Statement shewing the amount of Pay drawn by the Civil Engineer's Department 8th Division, during the 10 years ending with 1851.

Years.	Civil Engineer.			Establishment.			Total.			Assistant Civil Engineer.			Establishment.			Total.			Surveyors.			Assistant Overseers.			Superintendents.						Total.		
																									Trunk Cotton Road.			Branch Cotton Road.					
1842............	8,793	11	9	1,776	0	0	10,569	11	9	1,101	7	8	347	14	8	1,449	6	4	4,404	15	6	0	0	0	0	0	0	0	0	0	16,429	1	7
1843...	9,812	0	0	1,768	1	6	11,580	1	6	0	0	0	0	0	0	0	0	0	3,716	10	1	0	0	0	0	0	0	0	0	0	15,296	11	7
1844............	9,800	0	0	1,776	0	0	11,576	0	0	0	0	0	0	0	0	0	0	0	2,857	10	0	0	0	0	0	0	0	0	0	0	14,433	10	0
1845.....	9,740	0	0	1,776	0	0	11,516	0	0	0	0	0	0	0	0	0	0	0	2,940	4	5	0	0	0	0	0	0	0	0	0	14,456	4	5
1846............	9,824	0	0	1,776	0	0	11,600	0	0	0	0	0	0	0	0	0	0	0	3,380	2	6	0	0	0	0	0	0	0	0	0	14,980	2	6
1847............	9,748	0	0	1,776	0	0	11,524	0	0	1,153	10	8	162	0	4	1,315	11	0	3,176	3	3	722	7	3	0	0	0	0	0	0	16,738	5	6
1848............	9,720	0	0	1,776	0	0	11,496	0	0	2,256	0	0	672	0	0	2,928	0	0	3,829	3	1	922	12	9	0	0	0	0	0	0	19,175	15	10
1849	9,760	0	0	1,776	0	0	11,536	0	0	2,298	0	0	672	0	0	2,970	0	0	4,489	15	2	639	2	3	0	0	0	0	0	0	19,655	1	5
1850............	9,744	0	0	1,776	0	0	11,520	0	0	3,037	6	2	672	0	0	3,729	6	2	3,470	14	0	659	2	3	902	15	6	0	0	0	20,285	5	11
1851............	9,840	0	0	1,776	0	0	11,616	0	0	3,495	0	0	707	0	0	4,202	0	0	3,706	12	8	147	6	9	2,295	0	0	1,579	5	4	23,546	8	9
Grand Total...	96,781	11	9	17,752	1	6	1,14,533	13	3	13,361	8	6	3,232	15	0	16,594	7	6	35,980	10	8	3,110	15	3	3,197	15	6	1,579	5	4	1,74,997	3	6

Civil Engineer's Office, 8th Division,
Veerapaundien Putnum,
31*st March*, 1854.

W. H. HORSLEY, CAPTAIN,
Civil Engineer 8th Division.

Statement shewing the amount of pay drawn by the Maramut Establishment in the Collector's Department during the 10 *years ending with* 1851.

Years.	Madura.												Tinnevelly.												Total.		
	Maramut writer.			Superintending maistry.			Maistries.			Goomastahs.			Maramut writer.			Superintending maistry.			Maistries.			Goomastahs.					
1842...	......	...	...	420	...	...	1,405	6	0	1,589	8	6	339	3	4	650	...	...	1,746	...	...	1,095	0	0	•7,245	1	10
1843...	......	...	...	565	...	...	1,171	...	...	1,355	6	0	353	15	8	600	...	...	1,675	3	2	1,086	7	8	6,807	0	6
1844...	280	...	...	600	...	...	1,095	7	0	1,224	...	...	362	6	0	600	...	...	1,672	4	0	1,078	8	2	6,912	9	2
1845...	420	...	...	597	...	...	1,107	4	0	1,224	...	...	368	14	8	600	...	...	1,612	13	5	1,135	3	4	7,065	3	5
1846...	420	...	...	554	11	0	1,054	...	...	1,157	...	...	358	14	0	432	4	2	1,643	...	...	1,108	14	5	6,728	11	7
1847...	420	...	...	481	11	0	1,038	...	...	1,224	...	...	349	8	7	338	11	4	1,691	13	5	1,110	13	5	6,654	9	9
1848...	420	...	...	600	...	...	1,041	...	...	1,224	...	...	352	8	10	600	...	...	1,680	...	...	1,152	13	3	7,070	6	1
1849...	420	...	...	600	...	...	1,064	...	...	1,224	...	...	362	13	2	600	...	...	1,666	14	1	1,179	13	9	7,117	9	0
1850...	420	...	..	600	...	...	1,032	...	...	1,224	...	...	367	15	4	598	5	4	1,672	10	1	1,185	3	1	7,100	1	10
1851...	420	...	...	600	...	...	1,044	...	...	1,224	...	...	355	3	6	600	...	...	1,657	2	7	1,152	13	4	7,053	3	5
Grand Total..	3,220	...	...	5,618	6	0	11,052	1	0	12,669	14	6	3,571	7	1	5,619	4	10	16,717	12	9	11,285	10	5	69,754	8	7

Civil Engineer's Office, 8th Division,
Veerapandienputnum,
31st *March*, 1854.

W. H. HORSLEY, CAPTAIN,
Civil Engineer 8th Division.